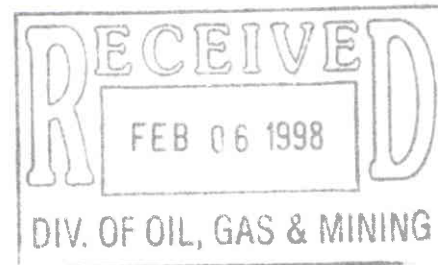


Pamela Grubaugh-Littig
STATE OF UTAH
Division of Oil, Gas & Mining
1594 West North Temple, Suite 1210
Salt Lake City, Utah 84114-5801

February 3, 1998

RE: Revision to Chapter 3 & Chapter 4 (1/30/98)
Star Point Mines (ACT/007/006-96C, Folder No.3)



Dear Ms. Grubaugh-Littig

In behalf of *CYPRUS PLATEAU MINING COMPANY*, please find three (3) copies of a revision to Chapters 3 and Chapter 4 of the Star Point Mines MRP. The copies include one that is a *redline/strikeout* version. The redlines are text and figures that have been added to the existing chapters and the strikeouts are proposed to be deleted from them. Additionally, two "clean" copies that do not show the redlines and have deleted all struckout text have been included.

As an introduction to your review, the revisions included herein were based on previous versions of Chapter 3 (dated 6/23/97) and Chapter 4 (dated 11/14/97). The revision addresses several issues presented in the Division's Technical Analysis and Findings (September 12, 1997) as well as attempts to clarify the baseline vegetation information and the revegetation plan. This should facilitate implementation of final reclamation plan.

Please see that **Susan White** receives a copy of the *redline/strikeout* version plus a *clean* copy. Also, please thank Susan for providing comments in meetings and telephone conversations in preparation of this document.

Included also with this letter are the Division's C1 and C2 forms with appropriate signatures. If you have questions or comments, please call Johnny Pappas at (435) 472-4741 or me at the number below.

Sincerely,

Patrick D. Collins, Ph.D.
Environmental Consultant

cc: J. Pappas (CPMC)

File in:

☐ Confidential

☐ Shelf

☒ Expandable

Refer to Record No. 0053 Date 0206/1998
In C 0070006 1998 Incoming
For additional information

Form DOQM - C1 (Last Revised February 3, 1998)

COPY

APPLICATION FOR PERMIT PROCESSING

Permit Change X

New Permit

Renewal

Transfer

Exploration

Bond Release

Permit Number: ACT/007/006

Title of Proposal: Response to vegetation/biology/landuse deficiencies, ACT/007/006-96C

Mine: STAR POINT MINES

Permittee: CYPRUS PLATEAU MINING

Description, include reason for application and timing required to implement:

Update Chapters 3 and 4 pursuant to the Divisions Technical Findings dated September 12, 1997 for the Star Point Mine

Instructions: If you answer yes to any of the first 8 questions (gray), submit the application to the Salt Lake Office. Otherwise, you may submit it to your reclamation specialist.

Yes	X No	1. Change in the size of the Permit Area? acres Disturbed Area? acres increase decrease
Yes	X No	2. Is the application submitted as a result of a Division Order? DO #
Yes	X No	3. Does application include operations outside a previously identified Cumulative Hydrologic Impact Area?
Yes	X No	4. Does application include operations in hydrologic basins other than as currently approved?
Yes	X No	5. Does application result from cancellation, reduction or increase of insurance or reclamation bond?
Yes	X No	6. Does the application require or include public notice/publication?
Yes	X No	7. Does the application require or include ownership, control, right-of-entry, or compliance information?
Yes	X No	8. Is proposed activity within 100 feet of a public road or cemetery or 300 feet of an occupied dwelling?
Yes	X No	9. Is the application submitted as a result of a Violation? NOV #
Yes	X No	10. Is the application submitted as a result of other laws or regulations or policies? Explain: MSHA
Yes	X No	11. Does the application affect the surface landowner or change the post mining land use?
Yes	X No	12. Does the application require or include underground design or mine sequence and timing? (Modification of R2P2?)
X Yes	No	13. Does the application require or include collection and reporting of any baseline information?
Yes	X No	14. Could the application have any effect on wildlife or vegetation outside the current disturbed area?
Yes	X No	15. Does application require or include soil removal, storage or placement?
Yes	X No	16. Does the application require or include vegetation monitoring, removal or revegetation activities?
Yes	X No	17. Does the application require or include construction, modification, or removal of surface facilities?
Yes	X No	18. Does the application require or include water monitoring, sediment or drainage control measures?
Yes	X No	19. Does the application require or include certified designs, maps, or calculations?
Yes	X No	20. Does the application require or include subsidence control or monitoring?
Yes	X No	21. Have reclamation costs for bonding been provided for?
Yes	X No	22. Does application involve a perennial stream, a stream buffer zone or discharges to a stream?
Yes	X No	23. Does the application affect permits issued by other agencies or permits issued to other entities?

X Attach 3 complete copies of the application.

I hereby certify that I am a responsible official of the applicant and that the information contained in this application is true and correct to the best of my information and belief in all respects with the laws of Utah in reference to commitments, undertakings, and obligations, herein. (R645-301-123)

Signed: Name - Position - Date
John Pappas - Sr. Env. Engineer - Feb 3, 98

Subscribed and sworn to before me this 3 day of FEB, 19 98

Notary Public
Jackie O. BogdinMy Commission Expires
STATE OF
COUNTY OF

UT CARBON

Notary Public
JACKIE O. BOGDIN
104 Helper Drive
Helper, Utah 84526
My Commission Expires
March 15, 2001
State of Utah

Received by Oil, Gas & Mining

FEB 06 1998

ASSIGNED TRACKING NUMBER

Application for Permit Processing

Detailed Schedule of Changes to the MRP

COPY

Title of Application:

REVISIONS TO CHAPTER 3 & CHAPTER 4
OF THE STARPOINT MINE MRP.

Permit Number: ACT/007/006

Mine: STAR POINT MINES

Permittee: CYPRUS PLATEAU MINING CO.

Provide a detailed listing of all changes to the mining and reclamation plan which will be required as a result of this proposed permit application. Individually list all maps and drawings which are to be added, replaced, or removed from the plan. Include changes of the table of contents, section of the plan, pages, or other information as needed to specifically locate, identify and revise the existing mining and reclamation plan. **Include page, section and drawing numbers as part of the description.**

DESCRIPTION OF MAP, TEXT, OR MATERIALS TO BE CHANGED

☐ ADD ☐ REPLACE ☐ REMOVE **Instructions below pertain to the "clean copy" (not the redline/strikeout version).**

☐ ADD ☐ REPLACE ☐ REMOVE

☐ ADD ☒ REPLACE ☐ REMOVE Replace new Chapter 3, pp. 300-1 thru 300-76 (1/30/98) with the old Chapter 3, pp. 300-1 thru 300-85 (6/23/97) of the current MRP.

☐ ADD ☐ REPLACE ☐ REMOVE

☐ ADD ☒ REPLACE ☐ REMOVE Replace new Exhibit 321.100a, pp. 1 thru 20 (1/30/98) with the old Exhibit 321.100a, pp. 1 thru 41 (6/23/97) of the current MRP.

☐ ADD ☐ REPLACE ☐ REMOVE

☐ ADD ☒ REPLACE ☐ REMOVE Replace new Chapter 4, pp. 400-1 thru 400-10 (1/30/98) with the old Chapter 4, pp. 400-1 thru 400-9 (11/14/97) of the current MRP.

☐ ADD ☐ REPLACE ☐ REMOVE

☒ ADD ☐ REPLACE ☐ REMOVE Add new Map 321.100g to current MRP.

☒ ADD ☐ REPLACE ☐ REMOVE

☒ ADD ☐ REPLACE ☐ REMOVE Add new Map 321.100h to current MRP.

☐ ADD ☐ REPLACE ☐ REMOVE

☒ ADD ☐ REPLACE ☐ REMOVE Add new Map 321.100i to current MRP.

☐ ADD ☐ REPLACE ☐ REMOVE

☐ ADD ☐ REPLACE ☐ REMOVE

☐ ADD ☐ REPLACE ☐ REMOVE

☐ ADD ☐ REPLACE ☐ REMOVE

☐ ADD ☐ REPLACE ☐ REMOVE

Any other specific or special instructions required for insertion of this proposal into the Mining and Reclamation Plan?

This document uses previous versions of Chapter 3 (dated 6/23/97) and Chapter 4 (dated 11/14/97) as a model for its contents.

A redline/strikeout copy has been included with this submittal to show what has been added (redline) and what is proposed to be deleted (strikeout) from the MRP.

Additionally, a "clean copy" has also been included. This clean copy does not show the redlines and has deleted all text that was struckout.

REVISIONS FOR VEGETATION & LANDUSE
CHAPTERS OF THE
MINING & RECLAMATION PLAN

FOR THE
STAR POINT MINES
ACT/007/006

for
CYPRUS PLATEAU MINING COMPANY
P.O. Drawer 7007
Price, Utah 84501

by
MT. NEBO SCIENTIFIC, INC.
P.O. Box 337
Springville, Utah 84663



January 30, 1998

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R645-301-300. BIOLOGY.

310. INTRODUCTION.

311 thru 313. GENERAL REQUIREMENTS.

The following discussion describes the vegetation, fish and wildlife resources in sufficient detail to identify the characteristics of the plant communities, wildlife species and their associated habitats found in and adjacent to the CPMC permit area. This evaluation addresses the types of biological organisms found in the area in order to ensure that all proposed mining activities minimize the impacts on these biological resources of the area .

320. ENVIRONMENTAL DESCRIPTION.

321. VEGETATION INFORMATION.

Included in the following description of the vegetation resources associated with the CPMC mine permit area are data collected by various federal and private biologists over a period of several years. Wherever the vegetation data obtained by the Manti-La Sal National Forest is relevant to this area it has been used. However, much of the agency data was collected with slightly different objectives in mind than are required to satisfy the Division's present regulatory requirements. It must also be pointed out that since the bulk of the biological data was collected beginning in 1981 and continuing to the present time the regulatory standards, guidelines and policies of the Division have changed. Due to the several regulatory changes which have occurred since much of these data were originally collected, and the subsequent disturbance of these areas it is challenging for operators to comply with all of the present standards regarding the biological resources found in the area. To the degree possible all of the original data have been reevaluated in light of the existing requirements of the Division. Where the older data do not comply with the present regulatory standards professional judgement has been exercised out of necessity. In the following discussion and tables, the previously collected data have been compared with the standards which existed at the time these data were originally collected as well as the present data standards.

In certain areas our knowledge of the vegetation resources has changed since these data were originally collected. This is particularly evident with respect to our knowledge of plant taxonomy, as well as threatened and endangered species. Several species have been deleted as being of potential concern. All of the plant names have been compared with those found in the most current taxonomic manual for the area. With respect to plant names those found in Welsh et. al. (1987) have been utilized and to avoid confusion and whenever possible, all of the tables have been changed to conform with this standard. All of the vegetation sampling efforts conducted at CPMC since 1982 have extensively utilized the abbreviated scientific plant symbols found in Plummer et. al. (1966). Many

of the tables also contain these plant symbols in order to ensure that as much information as possible is presented in the most convenient manner possible.

Much of the previously submitted biological information presented to the Division related to specific areas and actions that were never implemented and dropped from subsequent planning considerations. Examples include the proposed Seeley Canyon breakout and the original unit train loadout site. Biological baseline information collected in connection with these sampling efforts occupied a considerable volume of space in previous permit submittals. Since in nearly all instances these data are no longer sufficient with respect to the current regulatory standards, much of these data have been deleted from the present submittal and are discussed only in a general sense.

321.100. VEGETATION MAPPING & DISTURBED AREAS.

All of the vegetation types found within the CPMC permit area are shown on Map 321.100a, Permit Area Vegetation. This map at a scale of 1:12,000 shows the boundaries of all existing vegetation types within and immediately adjacent to the permit area. A breakdown of the acreage associated with each vegetation community found within the CPMC permit area is found in Table 321.100a, Permit Area Vegetation Type Acreages.

The extent of vegetation disturbance associated with all prior road construction and mining activities in the facilities areas at CPMC are shown on 1:4800 scale maps (Map 321.100b; Map 321.100c; and Map 321.100d). The disturbance associated with the existing Corner Canyon Fan Site is shown on Map 321.100e. Map 321.100f shows the vegetation types in the area of the Gentry Mountain Air Shaft site. Descriptions of the vegetation and wildlife types in this area are described in this Section and in Section 322.

Disturbed area maps have also been prepared that show the areas disturbed in relation to implementation of the Surface Mining Control and Reclamation Act of 1977 (SMCRA). These maps (Map 321.100g, Map 321.100h, Map 321.100i) show pre-SMCRA [not used since (for mining operations)], pre-SMCRA (used continuously since) and post-SMCRA disturbance areas. In contrast with the vegetation disturbance maps mentioned above, these maps *do not* show disturbances that will not be reclaimed when the mine site is reclaimed (i.e. County Road 290 and the disturbance associated with it).

TABLE 321.100a
Permit Area Vegetation Type Acreages

VEGETATION TYPE	ACRES
Douglas Fir	2120.05
Aspen	2012.17
Mountain Grassland	1671.22
Mountain Shrub	1137.89
Spruce/Fir	752.33
Sagebrush	685.43
Pinyon-Juniper	582.23
Saltbush	81.44
Barren	17.24
TOTAL ACRES	9060

The smaller scale maps were used to calculate the acreage of vegetation types within the permit area and the larger scale maps were used to calculate the extent of existing disturbance. These maps were compiled from a variety of sources. Mapping originally conducted for CPMC in 1980 and 1981 was used as a basis for portions of the vegetation maps. Mapping completed in these two years was conducted by Endangered Plant Studies, Inc. (EPS), and consisted of work covering the lower portion of the surface facilities area, particularly those areas surrounding the proposed Refuse Expansion Area.

In 1982, the Environmental Services Group of Getty Mining Company conducted detailed vegetation mapping at the proposed Corner Canyon Fan Site, the proposed Subsoil Stockpile Area and in the proposed Unit Train Loadout Area.

Mapping for the most of the permit area was completed during July 1986. Initially, vegetation types were mapped from a combination of black and white or color aerial photographs taken in 1983 and 1985, respectively. Field verification of the mapping including the current extent of disturbance was conducted during July 1986. The mapping of the vegetation within the Castle Valley Ridge Lease Tract areas was completed during July 1988. The mapping of the vegetation was finalized following the completion of field sampling efforts in Little Park Canyon in July 1991.

Since no information could be obtained outlining the characteristics of the vegetation prior to 1916 when the mine opened, photographs taken in 1976 (prior to when the current major expansion took place) and professional judgement was used to extrapolate the community types for previously

disturbed areas. The SCS soils mapping used this same kind of extrapolation. CPMC feels that the current assessment is the best available in light of the available information.

The disturbed vegetation acreage by type for selected pre-SMCRA (but continuously used for mining after SMCRA) areas and all post-SMCRA areas *excluding* County Road 290 are included in Table 321.100b.

TABLE 321.100b
Disturbed Acreage by Vegetation Type

VEGETATION TYPE	ACRES
Mountain Shrub	51.31
Pinyon-Juniper	21.31
Sagebrush	87.67
Douglas Fir	7.24
Mountain Grassland	13.41
Saltbush	8.01
Aspen	0.44
TOTAL ACRES	189.39

PLANT COMMUNITY DESCRIPTIONS

Table 321.100a, Permit Area Vegetation Acreage Type indicates that the permit area encompasses 9,060 acres with the lower portions of the permit area dominated by pinyon-juniper, sagebrush and saltbush vegetation types and the mountainous portions of the permit area dominated by coniferous forests containing Douglas fir, Engelmann spruce and Subalpine fir and the deciduous species aspen, and mountain shrub communities. Grass dominated areas are also common in many mountainous areas.

According to Table 321.100b, Disturbed Acreages by Vegetation Type, seven vegetation types have been disturbed in connection with pre-SMCRA (continuously used) and post-SMCRA mining activities. A list of the dominate plants growing in each of these plant communities is presented on Table 321.100c, in Exhibit 321.100a. A brief description for each of these community types has been given below.

Mountain Shrub Community

A total of 51.31 acres have been disturbed in the Mountain Shrub Community. This type consists of a small finger-like ridge south and just west of the existing coal refuse pile and another area north and east of the Lion Deck Portal. This type is dominated by taller shrubs and the more abundant plants include Utah Serviceberry (*Amelanchier utahensis*), Mountain mahogany (*Cercocarpus montanus*), and Mountain Snowberry (*Symphoricarpos oreophilus*). Big sagebrush (*Artemisia tridentata*) is also an important component of this community. This plant community usually grows on soils containing very little useable topsoil, and which possess numerous large boulders and rocks which lowers the water holding capability of these areas.

The Mountain Shrub Community in this area is not currently being grazed by livestock and is presently utilized only by wildlife. Very little evidence of human perturbation can be observed and there is no evidence of fire or reseeding.

Pinyon-Juniper Community

This community exists on many of the drier sites with poorly developed soils often associated with the steeper south facing slopes. This type accounts for 21.31 acres of the disturbance to the vegetation resources at CPMC (Maps 321.100b thru 321.100d). This type is called by some ecologists the pygmy forest since it is dominated by low growing trees which often contain an abundance of shrubs and a paucity of herbaceous plants in the understory. Pinyon pine (*Pinus edulis*) and Utah juniper (*Juniperus osteosperma*) dominate the overstory. Prominent shrubs found within this type include Wyoming Big sagebrush (*Artemisia tridentata* spp. *wyomingensis*), Utah Serviceberry, Mountain mahogany and Mountain snowberry. The sparse herbaceous cover is composed mainly of the grasses; Slender wheatgrass (*Elymus trachycaulus*), Salina wildrye (*Elymus salinus*), Prairie junegrass (*Koeleria macrantha*), and Indian ricegrass (*Stipa hymenoides*), intermingled with forbs including; Curlycup gumweed (*Grindelia squarrosa*), Colton locoweed (*Astragalus coltonii*), and *Eriogonum* spp.

Extensive portions of this type were disturbed by mining activities conducted prior to the recent legislation governing reclamation. The undisturbed portions that remain are used primarily as winter range by mule deer. At CPMC this plant community is the most common in the vicinity of the Topsoil Stockpiles, the Wash Plant Complex and the Lion Deck Portal Access Road.

Sagebrush Community

The Sagebrush Community occupies flatter areas near the Wash Plant and Coal Refuse Pile. These soils are generally more developed and productive than other soils. In most areas this type is dominated by Wyoming Big sagebrush but on more mesic sites Basin Big sagebrush (*Artemisia tridentata* spp. *tridentata*) is found. In many instances this type appears to occupy soils having

sandstone bedrock at a depth of approximately 30 inches. Floristically this type contains very few other plant species and Big sagebrush accounts for most of the plant growth in this community.

A total of 87.67 acres of Sagebrush have been disturbed, essentially all in the vicinity of the Coal Refuse Pile (321.100b, Disturbed Acreage by Vegetation Type). This type has been sampled both for predisturbance and reference areas.

This plant community is the commonly used type of mule deer winter range and nearly all areas show signs of heavy browsing and numerous pellet groups. This type shows no signs of recent fires, but the existence of Crested wheatgrass in the vegetation sampling suggests that portions of this type have undergone some form of range improvement in the past.

Douglas Fir Community

This type is ubiquitous across the permit area. A total of 7.24 acres have been disturbed by mining activities at CPMC (Table 321.100b). This type has been quantitatively sampled in the vicinity of the Mine No. 1 Portal, at the Corner Canyon Fan Site. This vegetation type can be characterized as coniferous forest being dominated by Douglas Fir (*Pseudotsuga menziesii*). The understory is dominated by Utah Serviceberry and Black chokecherry (*Prunus virginiana*). At the Star Point Mine No. 1 area and on the steep north facing slopes towards the Lion Deck Portal this community is composed of a mosaic of several stages ranging from relatively young stands to almost climax forest. This type contains few grasses or forbs with herbaceous species accounting for less than one percent of the total plant cover.

This plant community is used primarily as summer range for mule deer and as hiding cover by small mammals and birds. Due to the proximity of this type to numerous reseeded areas at CPMC this type is used extensively as hiding cover by mule deer. Due to the steepness of the slopes this type is grazed only by wildlife in the mine area and to a limited degree elsewhere within the permit area. Due to the steepness of the slopes and limited timber volumes this type does not show evidence of having been cut for timber or been burned.

Mountain Grassland Community

This type occurs throughout the CPMC permit area. It occupies a rather prominent band scattered between the stands of Douglas Fir from the Star Point No. 1 Mine westward to the Lion Deck Portal (Map 321.100b). This site typically occupies the more xeric locations across the permit area on sites with poorly developed soils and with more direct exposure. Salina wildrye is the dominant species accompanied by a host of forb species, the most common being Colton locoweed and Western yarrow (*Achillea millefolium ssp. lanulosa*). A total of 13.4 acres have been disturbed in this type (Table 321.100b).

Saltbrush Community

This plant community occurs along the lower portions of the Unit Train Loadout Area and on other sites where Mancos Shale is exposed. Total area for this community was estimated to be only 8.01 acres. This community is dominated by very low growing shrubs and drought hearty grasses and forbs. The total plant cover on these sites is the lowest of all plant communities sampled. The shrub component provides most of the ground cover followed by grasses and forbs. Shadscale (*Atriplex confertifolia*) is the dominant shrub species and accounts for most of the plant cover growing on this site. Slender wheatgrass is the most common grass. The dominant forb was *Eriogonum* spp.

The soils on these areas are very poorly developed due to the heavy clayey soil textures and steep slopes. Due to these two factors surface runoff is very high. Due to the low growth of the vegetation, which is often covered by snow during the winters, these areas receive little mule deer utilization during the winters.

Aspen Community

This community occurs most extensively at the Corner Canyon Fan Site and to a limited degree above the Lion Deck Portal. The Aspen Plant Community is dominated by the broad leaf tree Quaking aspen (*Populus tremuloides*). Total plant cover on the Aspen type is normally the highest of all plant communities found within the CPMC permit area. The dense shrubby and herbaceous understory is usually in excess of 60 percent. The most common shrubs are Mountain snowberry and Woods rose (*Rosa woodsii*). The most commonly occurring grasses are Kentucky bluegrass (*Poa pratensis*) and Slender wheatgrass. Forbs commonly contribute the most ground cover and the most common forbs include; Silky lupine (*Lupinus sericeus*) and Wayside gromwell (*Lithospermum ruderales*). This type is the most floristically diverse of all of the plant communities within the CPMC permit area. A total of .44 acres of Aspen have been disturbed by mining activities in the CPMC permit area.

Evidence suggests that where Aspen is located near south facing slopes this type is extensively used as hiding cover and as forage by mule deer and elk. This type has historically been extensively overgrazed on the Forest and the presence of Kentucky bluegrass suggests that many of these areas are in a disclimax condition.

QUANTITATIVE VEGETATION SAMPLING

Introduction

Since mining commenced at this location in 1916 and continued until 1981 before any attempt was made to quantitatively sample the vegetation, the CPMC mine complex is somewhat atypical of

the premise on which the Division's regulations are written, in that many areas had no chance of being sampled prior to disturbance and those which have been sampled since 1981 are believed on the basis of professional judgement of being representative of those sites which were disturbed earlier. The assumptions associated with this logic may or may not be valid.

Due to the long history of mining in the area and changes in the state and federal regulations, there has been a variety of vegetation sample techniques, designs, and goals for which these studies were based. Consequently, several reference areas have been chosen over the years, some of which may or may not be appropriate to be used as standards for revegetation success. The sampling of reference areas and their corresponding predisturbance areas was conducted initially in 1981 and has commenced to the present time. An attempt has been made in this document to review available vegetation data and other information to provide a logical, straightforward approach for future reclamation and to provide appropriate success standards that comply with current state and federal regulations. With this intent in mind, some of the reference areas have been dropped or replaced by other reference areas to be used as future success standards for revegetation. *Whereas, much of this is explained below in the sampling methodologies -- explanations, justifications and a complete summary of each area to be reclaimed and the standards chosen to represent final revegetation success have been included in Section 356.200.*

In 1981 two predisturbance areas and reference areas, the Mountain Shrub and Sagebrush areas were sampled adjacent to the Proposed Coal Refuse Pile Expansion Area. Because nearly ninety percent of the existing refuse pile and its expansion area was comprised of the Sagebrush community prior to disturbance (see Map 321.100c), the Sagebrush Reference Area was chosen to represent the standard for success and the Mountain Shrub Reference Area was removed from this consideration.

Since no additional disturbance was associated with the Douglas Fir or Mountain Grassland Communities during the post-SMCRA operations at the mine site, it was possible only to establish reference areas (with no predisturbance data) for these plant communities. Because these two communities are closely associated, exist adjacent to each other, and disturbance to them was pre-SMCRA, the Mountain Grassland Reference Area was chosen to be the standard for revegetation success (see Section 356.200).

In 1982 sampling involved both predisturbance and reference areas for two locations, the Corner Canyon Fan Site and the Unit Train Loadout Site. A reference area for the Subsoil Stockpile - Pinyon Juniper Reference Area was also established. Since that time a decision was made to use the Sagebrush Reference Area as the standard of success for the Subsoil Stockpile area and to drop the Pinyon Juniper Reference Area. Also, because the Corner Canyon Fan site is relatively small (less than one acre) and therefore not subject to the reference area standards by the state and because this area was subject to specific USDA Forest Service requirements, a reference area will not be used for a standard of revegetation success. The Unit Train Loadout site will use the reference area sampled in 1982 for a success standard. This reference area was called the Saltbush Reference Area (see Map 321.100c and Section 356.200).

No sampling of the native vegetation was conducted at CPMC between 1982 and 1989. In 1990 CPMC was informed by the Division due to changes in their vegetation guidelines that range

condition sampling would have to be performed on the established reference areas to verify that condition was still at least in the fair or better category.

1981 Data Collection

The 1981 data collection was conducted by EPS. Field studies were conducted between June and September 1981 for all previously disturbed mine areas and the proposed Refuse Expansion Area using the following methodologies:

Methods

Cover. Plant cover data for herbaceous and shrub understory species were obtained by using the ocular estimation method. One hundred foot transects were randomly placed in stands representing each community type. A two by five decimeter quadrat, divided into segments, was randomly placed at ten points along each transect, and the percentage of vegetative cover, bare ground, and litter estimated.

Shrub cover was evaluated using the line intercept method. One hundred foot transects were randomly placed in stands representative of shrub communities. The intersection of canopy cover along the transect was measured within ten foot segments. Measurements were recorded based on total cover equalling 100 percent. The dominant species was measured where the cover of different species overlapped.

Woody Plant Densities. The number of woody plant stems per acre was obtained by counting the number of stems rooted within a ten foot long and one foot wide belt transect located along the line intercept transect. Stems were recorded according to stem class sizes (0-1 inches, 1-2 inches, and 2-3 inches), and measurements indicate the total number of stems per acre, not the total number of shrubs per acre. Some single shrubs consist of numerous stems.

Tree Density, Species Composition, and Stand Maturity. Tree density, species composition, and stand maturity of the Douglas Fir and Aspen community types were measured using the point-quarter method (Curtis 1956), which gives relative cover and relative density values. Sampling points were selected randomly along the transect. At each quadrat the distance to the closest individual was measured along with the diameter and height of the tree. Core samples from trees encountered while using the quarter method were brought back to the laboratory and annual

growth rings counted. Successional status of tree stands was inferred from the studies involving measurements of species, composition, age, and size class distribution of trees.

Shrub Height. Shrub height by species was measured coincident with measurements taken by the line intercept method. Shrub height was measured by the use of a meter stick divided into decimeters and recorded coincident with the measurement of woody plant densities.

Sample Adequacy. In a meeting with DOGM on July 15, 1981, requirements for fulfilling sample adequacy were presented. The maximum number of sample plots need for characterization of a given community type was placed at forty, even if the adequacy formula indicted more than forty plots were needed. During this sampling process, in 11 cases where an 80 percent confidence level was not reached, at least fifty samples were taken, thus satisfying the DOGM requirements.

Predisturbance and Potential Reference Area Sampling.

The primary focus of the 1981 vegetation sampling centered in the selection of reference areas for previously disturbed areas and the planned expansion of the Coal Refuse Pile. Reference areas were selected based upon the similarity of the areas previously disturbed or proposed for disturbance in 1981, which was primarily aimed at the Refuse Expansion Area. Two predisturbance areas and reference areas, corresponding to the Mountain Shrub and Sagebrush Reference Areas were selected and sampled. As mentioned earlier, because the great majority of the disturbance for the refuse expansion site was in the sagebrush community and will be seeded as such, the area chosen to be a standard for revegetation success was the Sagebrush Reference Area.

In addition, potential reference areas to represent the Mountain Grassland and Douglas Fir Communities (pre-SMCRA disturbed areas between the Star Point No. 1 Mine Area and the Lion Deck Portal) were also studied. It was later concluded that the Mountain Grassland Reference Area would be used to represent standards in the pre-SMCRA disturbances for both the Mountain Grassland and Douglas Fir areas [see "Sampling Results" (1981)].

A Pinyon-Juniper Reference Area was also established in 1981, but this Pinyon-Juniper Reference Area was dropped in favor of using the Sagebrush Reference Area for the standard in this area.

Vegetation data was taken in the areas to be disturbed in the Refuse Expansion Area using the same methodology employed in the reference areas. The similarity of the predisturbance and reference areas was determined using a two-tailed t-test. T-values were calculated comparing the sampling means of predisturbance and reference areas. The similarity of plant species between the two areas was determined using the McArthur similarity index was obtained by comparing species composition in the paired areas based upon percentages calculated from measurements of cover.

1982 Data Collection

Methods

Cover and Woody Plant Density. Field data was collected on plant cover and woody plant density from randomly placed 50 meter transects. Cover data was estimated from a 10 point frame positioned every 5 meters along the transect. A total of 100 hits were recorded for each transect. Shrub density was determined by counting the total number of woody plants, within one meter on both sides of the 50 meter tape, resulting in a 2 x 50 meter belt transect. A 4 x 50 meter belt transect was used to determine tree densities at the Corner Canyon Fan Site. The average plant cover per transect and the total number of woody plants rooted within the 2 x 50 meter or 4 x 50 meter belt transect were used as one datum for determining sampling adequacy.

Sampling Adequacy. Sampling for both cover and density was performed to within 10% of the true mean with an 80% confidence interval within 10 percent of the mean. The statistical adequacy of sampling was verified by applying the following formula as presented on page 5 of the Vegetation Information Guidelines (undated) prepared by the Division. Sample adequacy was determined by using the following formula:

where:
$$Nm = \frac{t^2 s^2}{d^2}$$

- Nm = sample adequacy
- t = a constant (1.645 for grasslands, indicating a 90 percent confidence level, and 1.282 for shrublands, indicating an 90 percent confidence level)
- s = standard deviation
- d = one-tenth of the mean.

After completion of approximately 15 or more samples for each parameter, a test for adequacy of sample was taken. Additional samples were then taken when necessary.

Concurrent with the sampling of the areas proposed for disturbance, Plateau obtained approval for the location of reference areas and sampling techniques to be utilized. Field data collected in 1982 was utilized by Plateau to prepare and submit permit applications for the Subsoil Stockpile, the Corner Canyon Fan Site and the Unit Train Loadout Minor Modification. Areas sampled in all instances were confined to the proposed area of disturbance and corresponding reference area, when applicable.

Unit Train Loadout Area

Saltbush Plant Community. At the same time, the Getty Coal Company, Environmental Services Group also sampled two vegetation communities associated with the Unit Train Loadout Area, being the Saltbush and Pinyon-Juniper communities. The same vegetation sampling techniques described above were utilized in these two areas. Since the areal extent of the Pinyon-Juniper community disturbed in the construction of the Unit Train Loadout Facility disturbed less than 0.20 acres of this type and these data were originally submitted to the Division in connection with the Unit Train Loadout Permit, and since the Division's Vegetation Guidelines state that reference area comparisons for disturbances less than one acre in size are unnecessary, CPMC sees no reason to resubmit these data in the present permit application.

Corner Canyon Fan Site

Aspen Plant Community. On July 9th and 10th, 1982, the Getty Mining Company, Environmental Services Group sampled the vegetation characteristics at the proposed Corner Canyon Fan Site (Map 321.100e). Initially two vegetation types were sampled: Aspen and Douglas Fir types. Both data bases were originally submitted to the Division. However, upon construction of the fan site, the overall extent of planned disturbance was reduced and only 0.44 acres of the Aspen type were affected by the construction activities. This submittal will therefore discuss only the Aspen community with respect to vegetation sampling.

1990 Data Collection

Reference Area Range Condition Sampling

During July 1990 each established reference area located at CPMC was resampled to determine the present range condition of these sites. This evaluation involved the sampling of four cover transects using the inclined metal ten point frame described in the 1982 sampling. A total of 100 data points on each transect were averaged into an average composition value. Each site was correlated with the present Range Sites for each site as identified in the 1988 Carbon Area Soil Survey. The composition values were then compared to the allowable standard using methodologies found in the NRCS National Range Handbook to determine Range Condition Class. This methodology is considerable more quantitative than the Range Condition Class estimates originally used by the NRCS during their earlier permitting efforts.

1991 Data Collection

Proposed Little Park Canyon Fan Site

In 1991 a fan site in Little Park Canyon was proposed for disturbance. In anticipation for an amendment to the MRP, vegetation studies were conducted in this area. Since that time plans were changed and the fan site was not constructed. Because this site was not constructed these data sets were not included in this document. If the fan site plans were to be resurrected, these data would be submitted to the Division.

SAMPLING RESULTS

1981 Data Collection

Douglas Fir Community Study Area

A Douglas Fir community was sampled in 1981 as a potential reference area for areas that were disturbed by pre-SMCRA mining operations. The Douglas Fir and Mountain Grassland communities can be found in close proximity to each other. Subtle environmental conditions can dictate which of these two communities will become established in a given area. The two most significant variables are probably aspect and fire. After reviewing the data and because these communities are so similar in many respects, only one reference area was chosen to be used for a standard for future revegetation. This was the Mountain Grassland Reference Area. To avoid confusion, data taken in 1981 for the Douglas Fir community has not been submitted with this document, but can be made available on request.

Mountain Grassland Community Reference Area

Total cover for this community is approximately 44 percent (Table 321.100e Exhibit 321.100a). Salina wildrye is the dominant species at over 25 percent of the total cover. Colton locoweed and Western yarrow are the most frequently observed forb species. Douglas rabbitbrush and seedlings of Douglas Fir also occur sporadically throughout the community.

Sample adequacy for plant cover was calculated after 40 plots had been taken and found to be adequate at the 90 percent confidence level (Table 321.100d Exhibit 321.100a).

Mountain Shrub Community

Mountain Shrub communities can be found in several areas within the permit area of CPMC (Maps 321.100b, 321.100c, 321.100d). Most of the disturbance to these communities was done pre-SMCRA or in association with the county road, but there was a small portion of the refuse pile expansion that was within the boundaries of this community. Therefore, the area was also sampled in 1981 along with a potential reference area in this community. However, because over ninety percent of the post-SMCRA disturbance of the refuse pile was within the Sagebrush community, it was this community that was chosen as a reference area to represent future standards of success.

Data taken from sampling in 1981 for the predisturbance and potential reference areas of the Mountain Shrub community were not submitted with this document, but are available upon request.

Sagebrush Community

Predisturbance Area. Total plant cover for the Sagebrush Community was found to equal 42.1 percent (Table 321.100g Exhibit 321.100a). Bare ground was found to equal 32.7 percent, with litter comprising 25.2 percent. Big sagebrush was the dominant species with over 30 percent of the total cover. Bottlebrush squirreltail (*Elymus elymoides*) was found to be the next most frequent species with 4.9 percent of the total cover.

Shrub canopy cover for the Sagebrush Community predisturbance site equalled at 55.0 percent (Table 321.100h Exhibit 321.100a).

The woody plant density as measured by the number of stems per acre yielded a value of 19,776 of Big sagebrush (Table 321.100i Exhibit 321.100a). The total number of actual shrubs was measured separately indicating 13,329 shrubs per acre.

Reference Area. Total plant cover in the Sagebrush Reference Area was found to equal 33.7 percent (Table 321.100g). Total plant cover other than Big sagebrush in this community is minimal at only 7 percent. Most of the remaining ground cover consists of bare ground, with a small portion of litter. Big sagebrush is the most dominant species comprising 26.7 percent of the total cover. Bottlebrush squirreltail is the next most frequent species with 4.2 percent of the total cover. A total of 13 species were encountered in the cover sampling for this site.

Shrub canopy cover was composed largely of Big sagebrush equaling 35.6 percent (Table 321.100h).

Measurement of woody plant density resulted in 17,162 stems of Big sagebrush per acre (Table 321.100i).

Sample adequacy for total plant cover was calculated after 50 herbaceous plots had been measured and was found to equal 134.62 plots. Sample adequacy for shrub canopy cover was determined after sampling 50 ten foot segments was found to be sufficient at the 80 percent confidence level (Table 321.100h).

The mean values for cover and woody plant density were compared for the predisturbance and reference sites (Table 331.100f). The t-value for cover measurements indicated the sampling means are not significantly different at the .05 probability level. The t-value for canopy cover measurements indicated that the sampling means are significantly different at all levels of probability. The t-value for stems per acre measurements indicated the sampling means were not significantly different at the .10 probability level. The McArthur Index of Similarity, which determines similarity based on composition of species, indicated that the paired reference and predisturbance sites are similar in percentage of species composition. The index value was .77.

Table 321.100d is a summary of sample adequacy information for the sampling methods used in each site sampled during the 1981 vegetation sampling effort. The number of samples taken is the actual number of plots measured. The confidence level listed is the percent at which the number of samples taken is deemed adequate. While these data were collected using different sample adequacy criteria than required by the Division's present regulations these data document that using the sample size of 50 satisfied most of the current requirements.

1982 Data Collection

Subsoil stockpile

Pinyon - Juniper Community.

Most of the disturbance in this community was pre-SMCRA and was in association with the county road. This road will remain in place after final reclamation. There is only one area that was disturbed post-SMCRA within this plant community (Map 321.100c). This area is used for a subsoil stockpile site. Because this relatively small area is contiguous with the area to be reclaimed using the Sagebrush Reference area as a standard of success, and because Pinyon-Juniper communities are known to have relatively low cover and species diversity, the Sagebrush Reference area will also be used as a standard for revegetation success in the subsoil stockpile area.

The subsoil stockpile area was sampled in 1982 prior to any disturbance along with a potential reference area in the Pinyon-Juniper community, but these data sets were used only for comparisons and have not been submitted with this document. These data sets are available for review if needed.

Unit Train Loadout

Saltbush Community.

Predisturbance Area. The Saltbush Community was dominated by Shadscale which comprised over 40 percent of the total plant cover on both areas sampled (Table 321.100j, Saltbush Vegetation Type Predisturbance Plant Cover and Table 321.100k, Saltbush Vegetation Type Reference Area Plant Cover, Exhibit 321.100a). Slender wheatgrass was the second dominate species. *Eriogonum* spp. and *Salina* wildrye were found in smaller amounts, but were common in the predisturbance area. Shadscale was the most common shrub followed in abundance by Fourwing saltbush (*Atriplex canescens*) and Bigfoot sagebrush (*Artemisia pedatifida*).

Total plant cover of the predisturbance size was found to equal 16.31 percent after 16 transects were taken. Sample adequacy was achieved with 14 transects (Table 321.100j).

Reference Area. A total of 15 transects were taken to characterize the saltbush reference area. Average plant cover was found to equal 17.56 percent after 15 transects were collected. Sample adequacy was achieved with 11 transects in the saltbush reference area (Table 321.100k).

A statistical comparison of the total plant cover values for the predisturbance and reference areas yielded a t-statistic of 0.734 indicating that the mean values for total plant cover were not different. The same comparison of the mean shrub density values produced a calculated t-value of 0.404 indicating that the sites were similar with respect to woody plant densities (Table 321.100l, Saltbush Vegetation Type Predisturbance Area Woody Plant Density and Table 321.100m, Saltbush Vegetation Type Reference Area Woody Plant Density, Exhibit 321.100a). Calculation of the Sorensens's Similarity Index for these two sites yielded a value of 52.2.

Corner Canyon Fan Site

Aspen Community.

Predisturbance Area. Sampling of the proposed disturbance area revealed that total plant cover averaged 87.58 percent and litter averaged 11 percent (Table 321.100n, Corner Canyon Aspen Predisturbance Plant Cover, Exhibit 321.100a). Bare ground and rock totalled a combined 1.42 percent. Shrub density was calculated to equal 22.50 plants per 100m² and tree density was calculated to equal 22.64 plants per 200m² (Table 321.100o, Exhibit 321.100a).

Sample adequacy calculations for cover of the predisturbance documented that at the 80 percent confidence interval sample adequacy equalled 2. Shrub density was found to also equal 2. Tree

density was again adequate with 2 samples for the predisturbance area. The minimum number of samples taken for any parameter was 11 transects for sample adequacy, so sampling was adequate.

1990 Data Collection

Range Condition Sampling

Several areas have been proposed or studied in the past to be used as potential reference areas. More recently, however, it was decided that only the Sagebrush, Saltbush and Mountain Grassland areas sampled as potential reference areas will be used as standards for revegetation success. However, an evaluation in 1990 of the all established and potential reference areas was conducted according to the SCS Range Condition Class criteria. This study documented that the Corner Canyon Fan Site Aspen Reference (potential) Area, the Saltbush Reference Area, the Pinyon-Juniper Reference (potential) Area, the Douglas Fir (potential) Reference Area, and the Sagebrush Reference Areas were classified as having a "fair" range condition class. The Mountain Grassland and Mountain Shrub (potential) Reference Areas were found to have a "good" range condition class. These comparisons suggest that all of the existing and potential reference areas studied possess suitable range condition with respect to their utility as standards for measuring revegetation success. All of the 1990 and 1991 data were collected by IME. The individuals involved in these data collection efforts were Kent Crofts and Mark Jones both of whom have several years experience conducting these types of inventories.

1991 Data Collection

Little Park Canyon

At the time the proposed fan site was sampled planning had not identified the probable breakout site and vegetation studies were conducted on the entire west facing hill side. During this phase of the sampling two plant communities were sampled. The Aspen and Douglas Fir Plant Communities (Map 321.100c). Two predisturbance and corresponding references areas delineated on this map were also sampled. Subsequent planning has determined that the proposed footprint of the breakout and associated fan facilities will be confined only to the Douglas Fir Community . More recently, disturbance in the Little Park Canyon was postponed. Therefore, although quantitative data were collected from the Little Park Canyon area, it has been deleted from the Star Point MRP until the time it may be needed.

THREATENED AND ENDANGERED SPECIES

A review of the most current scientific literature (Welsh and Chatterley 1985) and formal consultation with the computer database of the Utah Natural Heritage Program, Mr. Larry England, Endangered Species Specialist with the USFWS, and Mr. Bob Thompson of the Forest suggest that there is a possibility of two sensitive or candidate plant species occurring on the CPMC permit area. These species are the *Hedysarum occidentale* Green var. *canone* Welsh and the *Hymenoxys helenoides* (Rydb.) Cockerell.

Formal investigations to document the potential occurrence of these plants were initiated in 1980 when Dr. Stanley Welsh of Endangered Plant Studies, Inc. conducted detailed literature and field surveys in the permit area. During investigations conducted during the summer of 1981, emphasis was placed on these species. These investigations utilized the following methods. A quarter section by quarter section field search for these species was made on all the lease area. Field transects were conducted by field personnel walking 100 feet apart along parallel transect lines through each quarter section. Results of this survey reported that none of these species or any other species being considered for threatened or endangered status were found in the study area.

In 1982 during the permitting efforts directed at the Corner Canyon Fan Site, the USFWS expressed concerns regarding the possible occurrence of *Hedysarum occidentale* var. *canone* in Corner Canyon. Contact with Mr. Bob Thompson of the Manti-La Sal National Forest Supervisors office revealed that his surveys of the Corner Canyon site and surrounding area had failed to locate this species.

During 1984 during the Unit Train Loadout permitting process, the issue was once again examined by the USFWS and the negative determination was made regarding the likelihood of the species of concern existed in this area. Discussions with Mr. Bob Thompson during May, 1986 by CPMC's consultant, Kent Crofts, confirmed that no new sitings of any threatened or endangered plant species had recently been made for in or near any areas of the CPMC permit area.

In 1988 in connection with the required annual reclamation monitoring a population of Canyon sweetvetch was encountered growing on a road cut on the Lion Deck Portal Assess Road. This population consisted of nearly two dozen individuals. The identification of these plants was confirmed by Mr. Bob Thompson of the Forest.

At this same time intensive investigations were made by Mr. Ron Kass of Endangered Plant Surveys, Inc. and Mr. Kent Crofts of IME on portions of the proposed Castle Valley Ridge Lease. Consultation with Mr. Bob Thompson revealed a population of *Hymenoxys helenoides* was growing in Nuck Woodard Canyon. He provided xerox copies of photographs of this population and portions of two days searching failed to result in the plants being located. These investigations resulted in no species of concern being identified in any of the areas examined.

During July of 1991 several additional plants of Canyon sweetvetch were located on the Gentry Mountain road. This population consisted of approximately two dozen plants also.

The locations of these two populations are depicted on Map 321.100a. Since both of these populations are well beyond any proposed disturbance there is no likelihood that any actions associated with this permitting action will have any impact on these plants.

321.200. PRODUCTIVITY AND RANGE CONDITION.

Various productivity estimates have been obtained for lands within the existing permit area. In 1981, Doctors Welsh and Murdock of EPS conducted range condition and productivity studies. Findings from their surveys for areas pertinent to the current submittal indicated that low elevation pinyon-juniper areas were currently in "fair" conditions and in 1981 produced 1,115 pounds of potential forage with a potential productivity of 1,650 pounds per acre. Sagebrush lands were also in "fair" condition and producing 1,400 pounds of forage with a potential yield of 2,000 pounds of forage per acre. Both potential reference areas established in the No. 1 Mine Area were found to be in "excellent" condition. The mountain grassland in 1981 yielded 2,300 pounds of forage with a potential yield of 2,300 pounds per acre.

The Douglas Fir (potential) Reference Area was in 1981 to be producing 822 pounds of understory herbaceous vegetation and potential productivity was also given as 822 pounds of forage per acre.

Records obtained from Mr. Bob Thompson of the Manti-La Sal National Forest for the western portion of CPMC's permit area reveal that vegetation within this area is part of the Castle Valley Ridge C&H Allotment Vegetation Ratings for lands within the CPMC Permit Area range from 54 to 64 and indicate an acceptable range condition.

Examination of the SCS files for the Star Point Mines permit area revealed at least 11 "range condition record" forms relating to vegetation sampling conducted by SCS Personnel. All eleven of these forms documented range condition of at least "fair" condition class. The Douglas Fir Vegetation Community (Woodland Range Site) was considered "excellent" and producing 500 pounds of forage when sampled in 1981. The location of this site is SCS Soil Pit #150. Samples correlating with the Pinyon-Juniper Vegetation Type included soil Pit #530 (Upland Loam Range Site) considered in "fair" condition and yielding 1,200 pounds of forage. Another Pinyon-Juniper site sampled as Pit 1 (Upland Loam Range Site) was in the same class and was producing 1,000 pounds of forage. The Upland Stony Loam also apparently in the Pinyon-Juniper Area was rated in "good" condition class and producing 1,500 pounds of forage. Range sites corresponding to the mountain shrub vegetation type included the mountain brush (Soil Pit #531) in "fair" condition and producing 1,000 pounds of forage; another two mountain brush locations designated as Pits A-4 was in "fair" condition class and yielded 1,200 pounds of forage. Three other mountain brush range sites designated as Pits A-5, A-7, and C-1 were in "good" condition class and producing 1,200, 1,200 and 1,600 pounds of forage respectively. All reports indicated that the trend was improving. This information is presented to document the acceptability of range condition classes in reference areas established at the Star Point Mines. Since formal determinations regarding range condition and productivity have been previously submitted in previous permit applications and no new disturbance

beyond that addressed by these determinations is proposed beyond the scope of these earlier letter this information will not be resubmitted with this application.

Records corresponding with the mountain grassland vegetation type (Range Sites High Mountain Loam Pit A-3 and Mountain Loam Range Site Pit A-G) were both considered to be in "good" condition class and producing 2,000 and 1,200 pounds of forage, respectively.

The SCS was contacted during August of 1991 regarding the evaluation of the future potential Little Park Canyon Fan Site with respect to a range condition and productivity estimation. According to Mr. Jan Anderson, the SCS District Conservation in Price, their schedule had not allowed for this evaluation to be completed as of September 12, 1991. Accordingly, the range condition and productivity of this site were determined using the identical procedures outlined for the 1990 Range Condition sampling.

According to the SCS's 1988 Soil Survey of the Carbon Area, Utah this Douglas Fir site belongs to the Mountain Very Steep Stoney Loam which produces between 400 and 700 and averages 500 pounds of air dry forage per acre. According to the species composition characteristics, as determined from the plant cover data, this site possesses "fair" range condition class.

322. FISH AND WILDLIFE INFORMATION.

Information addressing Division and OSM concerns during CPMC's permitting history since 1980 have been incorporated into this review where appropriate. All data gathered since the first permit application submittal is presented and the entire wildlife resource is discussed with updates where appropriate.

The purpose of this section is to inventory the wildlife resources in the CPMC permit area and to evaluate the impact of the operation of the mine on those resources. The study includes fish, aquatic insects, birds, amphibians, reptiles, and mammals. Analysis entailed a review of the applicable literature, consultation with the relevant agencies, field analysis, and impact evaluation.

In sum, this study uncovers minimum impact on wildlife from continued operation of the mine. Since the Star Point Mines have been worked since 1917, the ecosystem has already stabilized with mining.

322.100. WILDLIFE CONSULTATION.

Since the original mine permit was prepared in 1980, CPMC has attempted to develop an open and straightforward working relationship with all state and federal agencies having responsibility for wildlife and environmental resources. In this time innumerable contacts have been made. Probably the most important recent contact involving this submittal center on consultations made during 1988 during the leasing stage of the Castle Valley Ridge area wherein consultation was made extensively with CPMC's consultant and Mr. Larry Dalton, of the UDWR wherein input was solicited regarding

the most current wildlife baseline information for this area and of CPMC's intentions to apply for a new permit for this area. In June of 1991 CPMC cooperated with the UDWR in their annual raptor monitoring which has been an ongoing cooperative effort since 1982. Most recently, contact was made with Mr. Ken Phippen of the UDWR office in Price to update the concerns of the UDWR regarding CPMC's permitting plans. All of these contacts demonstrate the willingness of CPMC to see that wildlife concerns are incorporated into the decision making regarding their mine planning.

322.200. WILDLIFE RESOURCE INFORMATION.

TERRESTRIAL RESOURCES

This research was designed to qualitatively evaluate the terrestrial vertebrate components in habitats which may be affected by the CPMC Mines. Methodologies were selected to establish faunal compositions and status by habitat type.

Methodology

The following working objectives were established to provide the necessary evaluation criteria:

1. Conduct a literature review and detailed analysis of Utah Division of Wildlife Resources' (UDWR) information and initial report and wildlife plan for the Star Point mine project and geographic area of concern.

A thorough literature review was conducted. The libraries at each of the major universities in Utah were surveyed. Special emphasis was given to location of published literature pertinent to the geographic area and habitat types in question. In addition, unpublished theses were reviewed for pertinent data.

Visits were also made to state and federal agencies that have jurisdiction or control over the study areas. All pertinent reports and management plans were reviewed, and appropriate personnel were questioned.

2. Contact the regulatory authorities to determine what wildlife information might be required.

The regulatory authorities were contacted by mail, telephone, or personal visit to determine what wildlife information would be required.

3. Establish study sites in the potentially impacted habitat types for surveys of the terrestrial vertebrates.

Study sites were arbitrarily selected in the habitat types of concern.

4. Identify and cursorily inventory the terrestrial vertebrates by species for each of the habitats in the area of potential impact. Determine migratory utilization of the habitats.

Literature analysis and field observations were conducted to determine the probable and actual inhabitants of the area of potential impact and to identify habitats significant to their presence and/or persistence. A combination of plots and line transects was used to determine terrestrial vertebrate presence (Hayne, 1949; Emlen, 1977) and habitat utilization (pellet group counts, spotlight census). The transects were 1,000m long and placed in representative areas of the vegetation habitats of concern. Traps and/or observation sites along the transects were spaced at 10-m intervals. This guaranteed that spacing was not in excess of the potential home range of the fauna being sampled.

5. Categorize the status of each species and highlight those that deserve special attention because they are endangered or threatened or of economic or recreational value.

The methods and procedures essential to accomplishment of this objective involved basically two things. First, all of the species observed or known to inhabit the potential areas of impact were identified to species through Objectives 1 and 4 and listed phylogenetically in tabular form. Second, all species were categorized by habitat, relative abundance, resident species, seasonal use, and/or high interest species. The term "high interest species" designates those animals that require special attention by scientists and/or public management agencies because they are either endangered, threatened, protected game, or of economic or recreational value. The reasons for this high interest designation include: ranges are small, thus restricting population to perhaps a few, although populations may be numerically large, ranges may be small within the entire represented area, irrespective of population numbers or range, little is known of the current status and in some cases information suggests that populations are declining, species are sensitive to impact and may be in danger of abnormal declines, species are relict or may have aesthetic or scientific value, economic or recreational importance, and combinations of the above.

6. Evaluate and discuss in report form the significant inter actions on the terrestrial vertebrates present. High interest species are to be highlighted.

This objective is satisfied by discussions of the significant habitats, interactions, and potential results of the impacts on the terrestrial vertebrates. The data are summarily presented in tabular and mapped format to illustrate the above discussion. Impact on high interest mammalian species was rated on an impact scale, where impact scale used rates degrees of harm from no harm = 0 to total loss of the species in the area of concern = 10.

The numerical determination for a given species was determined in the following manner: All of the information that could possibly be obtained within the scope of work for the species in question was gathered from written, field, and verbal sources. The same was true for associated pertinent information regarding the abiotic and biotic habitat as well as the proposed impact action. With this information, the consequences of the action on the species in the area were evaluated and a numerical impact value from 0 to 10 was given. Pertinent points were raised, data were discussed, and the pros

and cons of the proposed action were evaluated in view of the criteria applied to the Wattis Planning Unit.

Sampling Methods

Detailed field studies to identify the wildlife species occurrence and habitat affinities were conducted in November, 1981 and July, 1982.

The Haynes Method of Determining Estimated Densities and Conversion Into Animals Per Unit Area was used to determine relative wildlife occurrence in a specific area. This involves the counting of the number of animals in each established transect. The series of transects form a grid which are over a unit area. Therefore, the number of animals per unit area can be determined.

Transects Per Habitat Type (1000 meters/transect)

Pinyon-Juniper Habitat/Sage Habitat, three transects overlapping both habitat types. Salt Desert Shrub Habitat, 1 transect. Mixed Mountain Brush and Grass Habitat, 1 transect.

Traps

100 traps/transect, 1000 meters/transect, or 1 trap every 10 meters: Pinion -Juniper Habitat/Sage Habitat, 300 traps. Salt Desert Shrub Habitat, 100 traps. Mixed Mountain Brush and Grass Habitat, 100 traps.

Pellet Groups

100 groups/transect, 1000 meters/transect, or 1 group every 10 meters. A two meter radius around each station. Pinion Juniper Habitat/Sage Habitat, 300 groups. Salt Desert Shrub Habitat, 100 groups. Mixed Mountain Brush and Grass Habitat, 100 groups.

Location of Transects (Traps and Pellet Groups)

Transect 1, Section 2, 11 T15S, In the proposed unit train area, running to the railroad tracks from SW to NE. Transect 2, Section 10, 11 T15S R8E, North of the existing road and running parallel to road in an E NE direction. Transect 3, W½ Section 10 T15S R8E, Northeast of Wattis and running parallel to railroad tracks from N to S. Transect 4, Section 15, 16 T15S R8E, South of Wattis in the proposed refuse pile extension area. Transect 5, Section 15 T15S R8E, South of Wattis on hillside, running from railroad tracks toward Wattis.

Survey Frequency

Surveys were conducted every night for four nights.

Wildlife Data References

Data on wildlife use of the area was obtained from field observations from the references listed at the end of this section and BLM/UDWR Wildlife Land Use Maps of the SE Utah region.

Existing Wildlife Resources

Wildlife Habitat in Mine Plan Area

The CPMC permit area is covered by several important habitats that are used by species considered of "high interest" to various management agencies because of economic or recreation value. For purposes of wildlife planning, there are five major vegetation habitats from a faunal standpoint: pinyon-juniper, salt desert shrub, sagebrush, mixed conifer-aspen, mixed mountain brush-grass, and mixed desert shrub. A detailed discussion of the vegetation resources within the CPMC permit area as well as their functional value for wildlife is presented in the response to Section 321. Detailed vegetation mapping of the entire permit area is presented on Map 321.100a. The important wildlife habitat types found in the CPMC Permit Area as obtained from the files of the UDWR are shown on Map 322.220a, Wildlife Habitat Types.

Map 322.220a

Terrestrial Wildlife and Habitat and Value Determination

Literature and field data were summarized for all terrestrial vertebrates of concern. The species were categorized to determine habitat affinities, high interest species status, and potential impacts as a result of mining related perturbation. These results are reported in Table 322.200a, Mammals That Occur or are likely to Occur on the CPMC Permit Area, Table 322.200b, Birds That Occur or are likely to Occur on the CPMC Permit Area, Table 322.200c, Reptiles and Amphibians That Occur or are likely to Occur on the CPMC Permit Area (Exhibit 322.200a). These tables contain information on all species whose published ranges are believed to overlap the CPMC Permit Area, and are listed according to their various ecological classifications.

The mine plan area could potentially be inhabited by about 75 mammalian, 172 avian, 7 amphibian, and 18 reptilian species. The accepted common names as well as their scientific names are presented in the above mentioned tables. Some of these species are considered high interest species for the habitats and local area of concern. High interest wildlife are defined as all game species, any

economically important species, and any species of special aesthetic, scientific or educational significance. This includes all federally listed threatened and endangered species of wildlife.

Results

Mammal Resources

The CPMC permit area is potentially inhabited by 75 species of mammals. The names of these animals and their habitat affinities are listed in Table 322.200a. Of the 75 species; 25 have been observed, 2 are reported as occurring in the area, 31 are likely to occur, and 17 potentially occur in the area. Represented are 6 orders and 17 families of mammals. Nineteen species are considered high-interest species, 14 of which are protected by state or federal code. The conifer-aspen and high elevation mountain brush-grass areas near the proposed Gentry Mountain Shaft Site, the Corner Canyon Fan Breakout, and the Mudwater Canyon Fan Breakout are used as summer range and possibly calving areas for elk, as well as summer range and fawning areas for mule deer. They are also utilized by cougar, bobcat, coyote, and possibly bear.

The low elevation mountain brush-grass and mixed conifer-aspen habitats in the foothills just above Wattis are utilized by elk during winter and spring. This same area is used during spring, summer, fall and, as indicated by fallen antlers, during winter by a few of the larger deer. However, the major winter area for mule deer is in the pinyon-juniper and mixed desert shrub habitats, along the lower hills and the entire foothill area. In all habitats, water is a critical resource and is possibly the limiting factor. The high interest species will be discussed individually later in this section. It is doubtful that the mine will seriously impact the other species.

Mammals. Only those mammals of major concern to management agencies are individually discussed.

Elk. The elk in the Wattis Planning Unit is a significant resource to the citizens of Utah. The elk are thought by the UDWR to be stable and productive. The majority of the potential impact area is not critical to the continued existence and perpetuation of the elk but portions of the area are utilized on a seasonal basis and should be given consideration during mining operations. The conifer-aspen and high elevation mountain brush-grass areas near the breakout and shaft areas are used as summer range and possibly calving areas for elk. Calving would occur from May 15 to July 15 and will be taken into consideration.

Most of the elk using the high conifer-aspen and mountain brush-grass areas during the summer migrate to the west in the winter. Fallen antlers were found in the hills above the mine portal, indicating that a few elk migrate to the hills surrounding the portal and that the low elevation mountain brush-grass and mixed conifer-aspen habitats in the foothills just above Wattis are

potentially utilized by elk from November 1 to May 15. The degree of use depends upon the severity of the winter. Excessive snow forces the elk into lower, more open habitats. Elk on winter ranges are notoriously sensitive to disturbance. These animals often have low energy reserves due to depletion by winter conditions; unnecessary disturbances by man can cause them to use critical and limited energy reserves. Such disturbance can result in excessive mortality, as in the winter of 1978-79 or, in less severe cases, to abortion or absorption of fetuses. Both situations reduce the productivity of the herd.

The fact that elk utilize the entire impact area during some portion of the year would normally mean that all aspects and timing of the proposed actions must be considered. The Star Point Mine has been operational for over 60 years and there are minimal new surface facilities planned. These factors, coupled with the fact that elk use is marginal indicates that there should be little, if any, additional disturbance to the elk. The animals have already accommodated human disturbance associated with mining and hauling coal. Subsidence should be of little consequence to the stability of vegetation communities but water resources must be monitored to detect impact. If water degradation or loss is detected an investigation will be conducted to determine possible mitigation.

Mule Deer. Mule deer on the CPMC Permit Area are considered part of herd unit 33 by UDWR. Historically, through 1977, this herd experienced the same general fluctuations as the other herd units of the state. Populations decreased in the early 1970's primarily due to severe climatic conditions, but took a general upswing through the summer of 1977. Then there were three consecutive years of severe decline wherein the deer were forced to the extreme lower limits of their winter range by abnormally deep and long-lasting snow. Winters since 1980 have generally been colder than normal with greater than normal snowfall forcing the deer into the lower limits of their winter range. The exception to this is the winter of 85-86 which saw greater than normal snowfall, but mild temperatures which kept the snow melted off and thus provided good winter browse for deer allowing them to utilize their entire winter range, and even allowing use of the lower edge of their summer range for winter use.

The animals utilize the entire area of potential impact but seasonally concentrate in, and more heavily utilize, specific habitat types. The high elevation mountain brush-grass and conifer-aspen habitats near the Corner Canyon Fan, Mudwater Canyon Fan, future potential Little Park Canyon Fan Site and the Gentry Mountain Shaft Site areas are used for summer range and fawning. The low altitude mountain brush, mixed desert shrub, and pinyon-juniper habitats are used as winter range during normal winters; during excessive snow the deer move off the impact area and go east of the Utah Railway railroad tracks. The browse in the wintering habitats in the impact area is in relatively good condition and can facilitate overwintering of deer in a normal year; however, the same precautionary considerations must be given mule deer as were suggested for elk.

Mitigation measures have been conducted by enhancing winter range as discussed in the Mitigation and Management section to follow. According to Dalton (UDWR, 1980), water has been a limiting factor in mule deer winter range. By constructing eight ponds and fifteen sediment traps in addition to installing a guzzler at the mitigation area, CPMC has enhanced and expanded this winter range for

deer by providing water sources that were not naturally present. Overland conveyors and mule deer movement are discussed under Mitigation and Management.

Cougar. The entire Star Point Mine and proposed expansion area provide yearlong habitat for cougar. Cougars could range throughout the area, but their movements are dictated by migration patterns, human disturbance, and availability of their primary food source, mule deer. Several deer skeletons in ledges and crevices of cliffs in Sections 17 and 18, Township 15 South, Range 8 East, which are in and near the permit area are evidence of cougar presence. Two sightings of cougars immediately above the mine portals have been made in the past five years. In July, 1985, an adult cougar was sighted on the road just below the Lion Deck by one of Plateau's personnel. These sightings seem to indicate that there is a population of cougar in the mine area and that the cats are accustomed to the activity at the mine. In fact, the cat sighted in July 1986 was said to have run along the side of the road parallel with the employee's vehicle for about 200 feet. Since cougars are not abundant and are known to be secretive, avoidance will be practiced when the females are accompanied by young learning to hunt and survive.

This period in the life cycle of the cougar, however, is difficult to determine since they are known to reproduce year round. If cougar populations in the area of potential impact were high, this would be of major concern, but, since numbers are low and ranges extensive compared to the area of potential impact, the cougars will usually avoid human activity areas and there will be little impact on the overall cougar population.

Bobcat. The mine and adjacent areas provide habitats for bobcats. Although little is known about the Utah bobcat, one sensitive period would be late February when parturition occurs. May and June would also be a sensitive period because young bobcats, when first exploring and learning to hunt, are not as secretive as the cougar, making them less likely to avoid high human disturbance areas during these months. However, since this is an ongoing mining operation, impact on bobcats should be unchanged.

Black Bear. Only the breakout and ventilation shaft portion of the mine provide potential habitat for black bear, which are neither abundant nor active year round. Sensitive periods in the life cycle of the black bear are February and March when the cubs are born and during early summer when they accompany their mother on initial foraging expeditions. Since parturition occurs within the winter den, disturbance in the black bear habitat will be limited and there will be little impact during this sensitive period. The same is true of the initial foraging forays.

Mountain and Desert Cottontails. The entire mine area provides substantial value, yearlong habitats for cottontail rabbits. The young are born between April and July, which is considered a sensitive period, but the proposed actions will in all probability not seriously alter the reproductive potential of the populations. Hunting pressure most likely will not increase nor will illegal kill, however, this would not matter since hunted rabbit populations are more healthy and stable than nonhunted populations. Subsidence could potentially create a problem, but since it is limited to relatively small areas at a time, little overall impact will occur. It should be noted that disturbed vegetation leading to succession would enhance reproductive potential of cottontail rabbits.

Snowshoe Hare. The snowshoe hare is present in and dependent upon the mixed conifer-aspen vegetation habitat year round. This habitat type is limited in the mine operations areas of disturbance and the proposed actions will do little to harm the habitat type and the dependent hare populations. Although the sensitive period for reproduction is from April 1 to August 15, there will be no serious long term impact on the snowshoe hare and there will be little change in population. Subsidence will not harm the above ground dweller as it potentially could the subterranean inhabitants. Hunting will be the most influential activity of man upon snowshoe hares but there should not be much difference from prior years and no long-term impact.

Furbearers. Limited portions of the mine and adjacent areas provide substantial value habitats for a few species categorized by management agencies as furbearers: ermine, long-tailed weasel, badger, and the striped skunk. Obviously, the breeding and rearing activities of these nonmigratory species occurs within the proposed impact area and their dens and burrow systems are important to maintenance of their populations; however, it is highly unlikely that there will be any serious long term impact created by the proposed actions of this specific project. After subsidence occurs, new burrows will be built or old ones reconstructed. These species are widespread and adaptable to the activities of man.

Small Mammals. Although small mammals do not qualify individually as high interest species, they represent a significant part of the ecosystem. The majority are herbivores and are the primary source of food for higher trophic levels, particularly raptorial birds, canids, and felids. This trophic importance warrants consideration. Since this mining project only involves the expansion of an ongoing operation, there will be little habitat loss due to construction and operation of additional surface facilities. Therefore, subsidence and its impact on underground burrow systems is the primary concern. The potential exists for caving in burrows and/or changing burrow continuity due to fracturing of the strata. Although this would temporarily alter the population density and age structure, recovery would be imminent and rapid since the breeding population contiguous and within the localized area of impact would not be lost. Additionally, the population densities are more than adequate to supply the limited number of predators present, particularly raptorial birds, that utilize the resource. Results from the small mammal trapping are summarized on Table 322.200d, Estimated Population Densities.

No population density studies have been conducted since 1981, but visual observations have been an ongoing practice at CPMC. Populations of ground burrowing squirrels and marmots have grown significantly in areas here interim revegetation has been conducted. The highly visible marmots in particular have spread from only one known location, during the earlier permitting stages of the mine, to now where the entire road from Lion Deck Portal towards the old No. 1 Mine Road now contain several colonies of marmots. The cuts and fills made while constructing the roads has obviously provided excellent burrowing areas and the associated vegetation planted by CPMC has provided a ready source of food for the expanded population.

Impacts to Mammals

Refuse Pile Expansion Area

The coal waste pile was started prior to the environmental regulations. In 1982, a plan to expand the waste pile to the south and west was approved as a part of the Mining and Reclamation Permit.

Disturbance resulting from mining, has most likely impacted and will further impact elk, mule deer, cougar, bobcat, mountain and desert cottontail, snowshoe hare, fur bearers, small mammals, amphibians, reptiles, and birds (Table 322.200e, Impacts of Mining on High Interest Mammals, Exhibit 322.200a).

Elk. The elk herd in the Wattis Planning Unit is a significant resource to the citizens of Utah. The area affected by the expansion of the present waste disposal area is not critical to the elk herd. The mountain brush-grass and mixed conifer-aspen areas surrounding the mine operation are used by elk on a seasonal basis, roughly from November 1 to May 15. The length of time and extent of the area used by the elk depends on the depth and length of time snow remains in the high country. Disturbances to elk during the winter season is most detrimental because of the limited energy reserves of the animals and should be kept to a minimum (Pritchett and Smith, 1980).

It is felt that elk usage of the area is marginal and operation of the Star Point Mines has been ongoing for many years. The expansion should cause minimal disturbance to the elk.

Mule Deer. The UDWR considers the mule deer on the mine property and adjacent area to be part of herd unit 33. These deer utilize the entire mine plan and adjacent area but seasonally concentrate in and more heavily use specific habitat types. The expansion of the present disposal area makes up only a small percentage of the low altitude mountain-brush, mixed desert shrub and pinyon-juniper habitats used as winter range during normal winters. Excessive snows force deer to abandon the area and move east to areas of less snow and more protection (Pritchett and Smith, 1980).

The browse in the foothills area is generally good and will stand over-wintering of deer in a normal year. Deer, like elk, should not be disturbed during the winter period due to low energy reserves.

The expansion of the refuse pile will probably result in the displacement of a number of indigenous wildlife species in the immediate area. However, because of the general abundance and distribution of the high interest species that utilize this area, it is felt that very little impact will occur on their overall populations.

Corner Canyon Fan Site

The area of potential impact is likely to be inhabited by twenty-five species of mammals. Twelve species are considered high-interest species, most of which are protected by State or Federal code.

The conifer-aspen and high elevation mountain brush-grass areas near the proposed breakout area is used as summer range and possibly calving areas for elk, as well as summer range and fawning areas for mule deer. They are also utilized by cougar, bobcat, coyote, and bear.

Further details regarding wildlife at this location can be found in previously submitted, Inventory of the Terrestrial Wildlife of Corner Canyon prepared in August, 1982 by Gar Workmen of Utah State University.

The primary impacts on wildlife in the Corner Canyon Fan Site or the future potential Little Park Canyon Fan Site would be some loss of habitat and some displacement. Of the big game animals, it is expected that the main impact will be to the mule deer. However, the deer currently seem to be very tolerant of the applicant's existing operations and often browse within sight of the operations. No known migration route will be blocked by the project. Considering the very small size of the disturbance (0.44 and 0.74 acres, respectively), and that the areas are very isolated, in mountainous terrain, very minimal impacts to mule deer are anticipated.

During a repeated visits to the fan site breakout, fresh deer tracks have repeatedly been observed in the mud at the edge of the sediment trap on the fan pad within thirty feet of the fan, which was and had been running for months. Deer seem to be very adaptive to human activity and associated mechanical facilities.

Birds

Methodology

A review of literature on birds was conducted using a computer data program and available publications on bird distribution. One trip was made to the Unit Train and Refuse Pile Expansion Area site in November, 1980; one trip was made to the Unit Train and Refuse Pile Expansion Area and the Seeley Canyon Breakout areas in June, 1981; one trip was made to the Unit Train, Seeley Canyon and Gentry Mountain Shaft areas in July, 1981. The Corner Canyon Fan Breakout Area was surveyed in July, 1982. The proposed Seeley Canyon Breakout did not take place because of underground mining conditions. Instead, a breakout location in Corner Canyon was selected. This area was covered by permitting work including birds and will be addressed later in this section.

Meetings were held to get agency input into the bird investigations at CPMC. The following were contacted or were met with: James Bates and Charles Greenwood (Wildlife Biologists - UDWR), Don Ward (Wildlife Biologist - U.S. Forest Service), Clark Johnson (USFWS).

Raptor surveys were initially conducted in 1981 and 1982 in the Corner Canyon area, as well as the entire permit area. Raptor surveys have been conducted yearly since 1982 in conjunction with the UDWR and the USFWS.

Species Occurrence

According to information prepared by the UDWR, the mine plan area is represented by the Transition and Canadian Life zones. In this area the UDWR states that there is a potential for 242 bird species in the area. The summary of habitats present in the mine plan area include parklands, riparian (very limited), cliffs and talus, sagebrush, pinyon-juniper forest, shrubland, aspen forest, and spruce-fir forest. A more detailed account of these habitats is contained in the Division's recent summary of animal occurrence in the area (Dalton et. al. 1990).

Results from these surveys suggest there is the potential of 172 species occurring in the CPMC permit area (Table 322.200b). These numbers can be broken down to 83 species which are known to occur, 32 species likely to occur, and 57 species which potentially occur within the CPMC permit area.

The Unit Train and Refuse Pile Expansion Area is represented by cliffs and talus (very limited), sagebrush, and pinyon-juniper. In this habitat, the typical arid desert species are represented. The only exception is the small riparian situation associated with sediment ponds on the area.

Two species of involved birds are on the endangered species list: the bald eagle (winter resident), and the peregrine falcon (thought to be a year-round resident in southeastern Utah). However, there are no known nesting sites for the peregrine falcon in this area. Because of the suspected transient nature of these birds, no problems are foreseen with the projected development of the mine facilities.

Impacts to Birds

Unit Train and Refuse Pile Extension Areas. Unit Train and Refuse Pile Expansion Area is the largest area of potential impact. The site is approximately 70 acres in size. It is also the area which would sustain the greatest impact to avian fauna. The area is covered primarily with pinyon-juniper trees, sagebrush and mountain brush. Some of the side canyons also contain large conifers; basically it is a high, dry desert environment. Some game birds may be on the site, but their numbers are extremely limited.

Although some impact may occur to other birds and the proposed Unit Train area, no serious impacts of any kind are anticipated because of the large amount of area in Carbon County of this same habitat type and the status of the birds involved. Continued monitoring activities of raptors in the area will document any impacts to nesting raptors.

Corner Canyon and Little Park Canyon (proposed) Fan Sites. Corner Canyon site was examined in July of 1982 in order to obtain field data for this report.

Two species of involved birds are on the endangered species list: the bald eagle (winter resident), and the peregrine falcon (thought to be a year-round resident in southeastern Utah). However, there are no known nesting sites for the peregrine falcon in this area. Because of the suspected transient nature of these birds, no problems are foreseen with the projected development.

Potential areas of impact involve only a very small area in aspen habitat in Corner Canyon. Forbs and grass make up the ground cover in this area.

Gentry Mountain Shaft Site. The proposed Gentry Mountain Shaft Area is an open parkland area with no potential nesting areas for many species of birds. However, species such as the Vesper sparrow, mountain bluebird, and other open area nesting species are common here. Adjacent areas provide conifer and aspen nesting sites for many birds. The impact on birds in this area is thought to be of little consequence.

High Interest Birds

The UDWR has requested that the issue of "critical habitat" be addressed as it relates to certain birds of "high interest". The only "high interest" birds thought to be found in the proposal area are:

Bald Eagle. The bald eagle is a rare, winter resident of this region of Utah, but no nesting of the bird is known to occur in the State of Utah. There is a remote possibility that trees in the proposal area would be utilized for roosting.

Golden Eagle. The golden eagle is a year-round resident in the vicinity of the applicant's operations. Annual raptor surveys have been conducted since 1982 in conjunction with the UDWR. Map 322.220a shows locations of all known and monitored raptor nest sites. Table 322.200f, Raptor Nest Sites Activity, in Exhibit 322.200a lists nest sites and nesting activity since 1982. This table shows nest activity in accordance with USFWS and UDWR inventory procedures. Nests that were "tended" or "maintained" i.e., that had fresh greenery in them, are listed as active.

Until 1986, little success in hatching by raptors is assumed since no young birds were observed in nests. Several nests were obviously tended as evidenced by fresh greenery in the nests. Unless the birds hatched and fledged unusually early, there was no success in any of the nests observed from 1982 through 1985.

Spotted Owl. Little is known about this species of owl. It is not known to inhabit this part of Utah.

Flammulated Owl. This owl is found state-wide in Utah. Because of its nocturnal habits, no information is available for the permit area.

Williamson's Sapsucker. This species is an uncommon, summer resident in the permit area. Its presence was documented during the survey, to the north of the CPMC Permit Area during wildlife investigations conducted at the Beaver Creek Coal Mine.

Black Swift. The UDWR has documented the presence of this bird in areas adjacent to the applicant's operations; however, it was not observed in the permit area during the field survey. It is a cliff-nesting species and resembles the white-throated swift except that it is all black and thus, highly visible.

Western Bluebird. This species is a year-round resident of the permit area.

Some adverse impacts to wildlife will occur at the Refuse Pile Expansion area. However, because of the large amount of area in Carbon County of this same habitat type and the status of the birds involved, no serious impacts of any kind are anticipated. The potential impacts of mining to the "high interest" wildlife species are summarized on Table 322.200e.

The Corner Canyon Fan Breakout, the future potential Little Park Canyon Fan Site, the Gentry Mountain Shaft and the Mudwater Canyon Fan Breakout areas comprise very small disturbances and as such will not have negative impacts on birds.

No active raptor nest sites are within one half mile of mining activities. Two old stick nest sites (No. 5 and 6) as shown on Map 322.220a are located in close proximity to mining operations. These nest sites appeared old and unused in 1978 when the access road immediately above them was constructed.

Underground mining in Section 18, T15S, R8E may cause subsidence which may affect the sandstone cliff face where two golden eagle nests exist (Nos. 20 and 21). No data on the effects to cliff faces and nests are available to indicate possible disturbance. These nests are addressed in greater detail in the response to Section 358, Fish and Wildlife Plan.

Table 322.200f (Exhibit 322.200a) describes inventoried raptor nests numbering from 28 nests in 1982 and increase through the years to 44 nests in 1997. According to the table, nests used by Golden Eagles are usually active one year and inactive the next. A group of 8 stick nests appears to have continued activity, whereas single nest locations are active for a period and permanently abandoned. Golden Eagle nest site No. 17 and Prairie Falcon nest site No. 2 have been active for 7 years of the 15 years inventoried. Nest No. 1, 11, 13, 14, 18, 22, and 28 were active at least 3 years of the 15. The remainder of the nest were active for 2 or less years. In the 44 nests inventoried, 23 young were seen over the 15 year period.

The reasons for a nest being active one year or inactive for 3 years and active for one year again would be at best an assumption. The majority of birds or raptors using the inventoried nests do not

use any nest consistently, therefore subsidence does not appear to be the dominant contributing factor for use or non-use, additional conditions obviously effect the use or non-use of nests. Additional information is contained in Table 322.200f.

Reptiles and Amphibians

The material used in this portion of the report was derived from literature obtained from Utah State University's data retrieval program.

Increasing elevation rapidly reduces the number and kind of reptiles and amphibians. In Utah, the more northern latitude reduces numbers of reptiles and amphibians in much the same way as does the increase in elevation.

The geographical and associated climatic factors have eliminated most desert species, leaving species that are adapted either to mountain habitats or montane type habitats developed in the more northern areas. Thus, the reptiles and amphibians of Utah, and particularly those inhabiting the area under consideration, have arrived in Utah by means of dispersal lanes coming from the northeast and the southeast. With few exceptions, the species listed have side distributions and are versatile in their adaptive abilities.

Literature pertaining to the amphibians and reptiles is extensive, but much of it refers to species occurring in the desert areas and has only limited reference to forms inhabiting high elevations in Utah. Most of the publications dealing with species lists for the state are old. The most up-to-date listing for the area under consideration may well be a checklist of Utah amphibians and reptiles (Tanner, 1975), and UDWR Publication No. 90-11 (Dalton et. al., 1990) which references a contiguous and similar geographic area.

Reptiles

Based on a review of the literature, it was determined that probably 18 species of reptiles (Table 322.220c). The breakdown of these species down as 1 species known to occur, 9 likely to occur and 8 potentially occurring in the area.

This area is considered to be a substantial value habitat for all species. All reptiles have some protection under the Utah code, but since the species listed are all widespread throughout similar habitats in Utah, none are treated as high interest species and, therefore, are not individually discussed.

Amphibians

Based on the literature review, it was determined that probably seven species of amphibians (Table 322.200c) inhabit the proposed area of concern which provides substantial value habitat for the these species listed. These species can be broken down as 2 which have been observed and five which are likely to occur in the CPMC permit area. All amphibians are legally protected in Utah, but since the species listed are all widespread throughout similar habitats in Utah, none are treated as high interest species, and, therefore, are not individually discussed.

322.210. THREATENED OR ENDANGERED SPECIES.

There are no endangered or threatened species of mammals in the mine plan area, nor are there any in proximity close enough to be considered to have the potential of being impacted by this permitting action.

Two species of birds are on the endangered species list: the bald eagle (winter resident), and the peregrine falcon (thought to be a year-round resident in southeastern Utah). During the 1996 raptor survey, a peregrine falcon was observed incubating or protecting its young at Site 11, located in Section 3, T15S, R8E. It was also observed during the 1997 survey.

There are no endangered or threatened species of amphibians or reptiles in the mine plan area. A detailed discussion regarding the existence of threatened or endangered plants is contained in the response to Section 321.00.

Official U.S. Fish and Wildlife Service (USFWS) Section 7 opinions relating to the aquatic resources of Huntington and Eccles Canyon drainages have indicated that no threatened or endangered species of fish or other aquatic organisms have been found in waters upstream of the lowest 2 or 3 miles of the Price or San Rafael Rivers.

According to the Utah Division of Wildlife Resources records, personnel from their office have performed threatened and endangered species surveys on the Star Point Mine site since 1981. UDWR personnel have included Ben Morris, Miles Moretti, Jim Karpowitz, Larry Dalton, and John Kimball, however Ben Morris has performed the majority of the recent surveys. The data from the UDWR do not always include the survey date or exact personnel performing the survey. The dates we do have are : 1997 survey done by Ben Morris; 6/11/96 surveyed by Ben Morris; 5/9/95 surveyed by Ben Morris; June 23, 1981 surveyed by Larry Dalton, and the 1990, 1992, 1993 letter signed by Miles Moretti. Correspondence was not exchanged every year, but confirmation should be available from the UDWR records. A letter for 1997 has been requested from Ben Morris and will be included in Exhibit 322.210a.

322.220 thru 230. HIGH VALUE WILDLIFE HABITATS.

IMPORTANT WILDLIFE HABITAT AREAS

The locations of all streams, wetlands, riparian, migration, reproduction or wintering area of significance to wildlife are depicted on Map 322.220a. This map shows the location of all such areas identified as being important habitat for wildlife. Wildlife species listed by the UDWR as being of special concern or of high importance to the region and their associated critical habitat components are listed in Table 322.220a, Relative Biological Value of Special Concern Animals by Habitat Type within the CPMC Permit Area (Exhibit 322.200a).

Aquatic Resources

The permit area includes the headwaters of two small perennial streams, Miller Creek, and Tie Fork Creek. Little Park Canyon is intermittent; it has been dry for at least 6 months of each year in 1992 and 1993. Other streams in the immediate permit area are intermittent (dry at least part of most years) or are of low water quality. No surface waters in the permit area are considered as important game fisheries resources by the UDWR. Tie Fork Creek as well as Little Park Canyon is important as a tributary to a quality trout stream, Huntington Creek.

The following aquatic resource descriptions address: 1) Miller Creek using information from a 1976 study (Southeast Association of Governments, 208 water quality study, by Vaughn Hansen Associates) and a 1979 study (USBLM water quality study of the EMRIA fossil fuel lease lands, by GeoScientific); and 2) Tie Fork Creek using information from a 1971 survey (UP&L Company Huntington Canyon Generating Station impact study, by BYU Aquatic Ecology Laboratory) and surveys conducted in 1980, 1981 and 1982. Due to the similarity between these small streams it is believed that water quality sampling of both would yield comparable data. 3) Nuck Woodward Creek using information from the surveys performed in the years listed on Table 322.220b.

Water quality, physical habitat and stream biota are all important components of aquatic resources. Water quality and hydrology are discussed in more detail in another chapter. In this chapter resource quality is based mainly upon aquatic macroinvertebrate community data with water quality and habitat descriptions used in a supporting role. Additional information is contained in Exhibit 322.220a, Aquatic Resources of Plateau Mine Permit Area.

Methodology

Miller Creek. The aquatic resource description of Miller Creek consists of a review of available information from previous surveys. Water quality determinations were conducted by certified Laboratories (Ford Chemical and BYU Environmental Analysis Laboratories). Biological samples were taken (1976 and 1979) with a modified Surber sampler according to standard methods (stratified random method, EPA, 1973). Analyses of data were made by the Aquatic Ecology

Laboratory under the direction of Dr. Robert N. Winget, Department of Zoology, Brigham Young University.

Tie Fork Creek. Macroinvertebrate samples were taken using a Surber sampler (Surber 1937) modified by Winget in 1971 (Reichert 1976). The modified sampler was designed with a larger collecting bag to prevent excessive backwash and loss of contents when collecting in deep, swift streams. Sample points were selected in each stream so as to obtain maximum information while minimizing sample variance. The stratified random method described by Weber (1973) in which environmental variance is minimized by selecting for only one habitat type to take samples from was used.

Samples were taken during spring and fall because they appear to have less variability from year to year than do summer samples. Samples were processed by the Aquatic Ecology Laboratory, Department of Zoology, Brigham Young University.

Tie Fork Creek is the combination of Gentry Hollow and Wild Cattle Hollow Forks. Impacts on either fork should show up as impacts on the aquatic community of Tie Fork Creek below their confluence, thus Station TF-01 (Figure 1 of Exhibit 322.220b, Aquatic Resource Description of Tie Fork Creek and Tributary Streams, Gentry and Wild Cattle Hollow), was selected for the main stream and Stations TF-WCH (Wild Cattle Hollow above confluence with Tie Fork Creek) and TF-GH (Gentry Hollow above confluence with Tie Fork Creek) were chosen to obtain baseline data for both of the tributary streams.

A detailed explanation of methodologies is included in Exhibit 322.220a, and 322.220b.

Existing Aquatic Resources

Miller Creek. Miller Creek below Hiawatha has a wide stream channel (mean width 23 ft) and on 8 April 1976 water width was only 8 feet with a mean depth of less than 0.3 ft. Stream substrates were relatively evenly distributed over rubble, gravel, sand and silt. There was a considerable amount of coal dust evident in the substrate materials. Stream banks were moderately stable with sparse willow and grass cover.

Water quality in Miller Creek was very poor in 1976 and 1979 with TDS ranging from 2,000 to over 6,000 mg/l. Sulfate levels ranged from 1,100 to over 3,800 mg/l. Dissolved oxygen was always high but BOD was from 1 to 2 mg/l, oxygen was maintained by turbulence of the water. The high levels of dissolved solids comes from the Mancos Shale formations at the stream source and along a considerable portion of its reach. Ammonia nitrogen was present on several occasions in excess of 7 mg/l. During 1976 nitrate nitrogen levels ranged from 0.4 to 1.4 mg/l N and phosphorous levels in the form of ortho-phosphorous were as high as 0.2 mg/l. This coupled with high levels of total and fecal coliform bacteria (greater than 1,000 and f70 MPN/100ml, respectively) indicated a strong

source of organic pollution tied in closely to fecal contamination. In 1979 there was less evidence of organic pollution in Miller Creek -lower numbers of bacteria.

The invertebrate samples collected on Miller Creek at Station MCI on 8 April 1976 showed an extremely high dominance by chironomid midge larvae with numbers of 11,800/m² (Table 1 of Exhibit 322.200a, Aquatic Resources of Plateau Mine Permit Area). The next dominant form was oligochaete worms, at 344/m². The community at this station was definitely under heavy stress.

In August 1979 there were 12 taxa of aquatic macroinvertebrates collected (Table 1 of Exhibit 322.220a), all tolerant to sedimentation and moderately poor water quality. Chironomids were the dominant taxa collected as during 1976 but the low numbers indicated less organic enrichment in 1979 or some physical factor(s) was limiting the numbers of macroinvertebrates.

This stream section has historically been under both water quality and habitat stress from natural as well as man caused factors. Potential for improvement is almost non-existent due to the extensive Mancos Shale and related formations of the area and limited water resources.

Miller Creek at Wattis Bridge, Station MC2, had 16 taxa of aquatic macroinvertebrates in samples collected August 1979 (Table 1 of Exhibit 322.220a). All of the taxa sampled are tolerant to sedimentation and moderate to poor water quality. The mean number/m² was only 847 which is quite low even for a small stream. This indicates that this stream has been under stress probably from low flows in the summer/fall/winter, scouring spring flows, sedimentation, low gradient including low water velocity, and a lack of quality riffle habitat in most of the stream. This was indicated by the presence of stratiomyids, ceratopogonids and oligochaetes. Compared with Station MCI, this station was somewhat better biologically speaking but still poor quality.

The aquatic macroinvertebrate samples taken Miller Creek Station MC3 on 8 April 1976 had approximately equal dominance by oligochaete worms and chironomid midge larvae, together comprising over 88% of the total number (Table 1 of Exhibit 322.220a). The mayfly Baetis was next in abundance. Dominance by any of these 3 taxa is indicative of a stressed situation and their high numbers would indicate heavy organic enrichment as well as a significant siltation of the stream.

This station, like the lower stations on Miller Creek has been, and still is, under stress from both poor water quality and habitat.

Tie Fork Creek. Historically, Tie Fork drainage has been under heavy grazing impacts. Tie Fork Creek in the region of the confluence of Gentry and Wild Cattle Hollow shows signs of habitat stress - steep stream banks with sloughing of bank materials common. Stream banks in some areas are as high as 30 to 40 feet vertical with no vegetative cover. Unstable stream banks are devastating to small streams such as Tie Fork and its tributaries where flow range from lows of less than 1 cfs to over 50 cfs during storm occurrences or spring runoff. With heavy chemical deposition, Tie Fork Creek probably has never been important to spawning fish but it has been, and still is, an important producer of fish food organisms for Huntington Creek.

The macroinvertebrate communities of Gentry Hollow and Wild Cattle Hollow are significantly different and each will be discussed separately.

In Gentry Hollow Baetis and chironomidae dominated the community in the spring and fall samples of both years, dominance greater in October (see Table 4 of Exhibit 322.220b). These two taxa often dominate communities subject to frequent physical environmental stress such as spring scouring and fall-winter low flows. Due to the steep gradient in Gentry Hollow the bottom of the stream remains free from silt. Water quality at this station is high and water temperatures remain low throughout the year due to high elevation and good stream riparian vegetative cover. The stream's high water and habitat quality are reflected in the presence of Brachycentrus americanus and Micrasema caddisflies (TQ values 24, 24, respectively) and the stoneflies, Amphinemura, Megarcys signata, and Diura knowltoni, (TQ's = 6, 24, 24, respectively). The presence of Parapsyche (TQ = 6) and Neothremma (TQ = 8) caddisflies indicate that this is a high quality, cool, headwater stream.

The macroinvertebrate community showed a degradation trend in 1981 similar to that seen in Tie Fork Creek below the confluence of Gentry and Wild Cattle Hollows. The BCI was 89 in May of 1981 and then dropped to 83 in October. In 1982 it had dropped even further to only 70 by June but recovery had begun by October as evidenced by a return of the BCI to 89.

A 1994 macroinvertebrate inventory was completed on both Gentry Hollow and Wild Cattle Hollow Forks which combine to create Tie Fork Creek.

Gentry Hollow had indications of sedimentation during the 1994 survey. The organisms present including Rhyacophila acropedes, Euparyphus, and Ephydriidae seemed to be tolerant of the adverse water chemistry. Cleanwater taxa indicated fairly good water quality, some good instream substrate and included Epeortus, Zapada cinctipes, Amphinemura, and Parapsyche elsis. The stream gradient of 2.0 should provide good maintenance capability. The DAT was 17.6 in the spring and 21.1 in the fall which indicates good to excellent biodiversity. The macroinvertebrate biomass of 7.9 g/m² could provide nutrients for a good fishery with some suitable spawning substrate. The ecosystem was in fair condition.

Wild Cattle Hollow. The macroinvertebrate community in Gentry Hollow was very similar to the communities of Wild Cattle Hollow and Tie Fork and was dominated by Baetis and chironomidae with the dominance greater in October than May or June (Table 5 of Exhibit 322.220b). The impact from the low flows of 1981 are evident with the BCI dropping from 82 in May 1981, to 80 by October of the same year and down to 77 by June 1982. The increase to 90 by October 1982, again shows the recovery process in operation.

During the 1994 survey there were some indications of organic enrichment and sediment. Cleanwater taxa indicated good water quality and included Epeorus, Zapada, Arctopsyche grandis, Amphinemura and Parapsyche elsis. Stream gradient was 3.0 and should have good maintenance capability. The DAT was 17.1 which indicates good biodiversity. The macroinvertebrate biomass of 7.8 g/m² could provide nutrients for a fishery with some suitable spawning substrate. The BCI indicates the ecosystem is in fair condition.

Nuck Woodward Creek. During the 1995 inventory there were some indications of seiment in the stream. Clearwater taxa included *Epeorus*, *Drunella doddsi*, and *Zapada cinctipers*, but none had resident population numbers. With a stream gradient of 2.0, the stream reach should have good maintenance capability. The DAT at this station was 11.6 which indicates good biodiversity.

Summer data from 1994 and 1995 at Station 1 shown condition to be close, however the biodiversity and numbers of organism were lower in 1995.

The potential for a fishery at this station appeared to be fair, with the macroinvertebrate biomass of 1.9 g/m² providing nutrients for a fairly good fishery.

During the fall inventory of Station 1 taxa included *Rhithrogena* and *Cultus* in addition to those found in the spring survey. The DAT was 16.9.

Compared to fall data from 1993 and 1994, conditions were about the same as in 1993 and similar to those in 1994. BCI values were 83 in 1993, 82 in 1995 and 79 in 1994. The biomass was 0.6 g/m².

Impacts of Mining to the Aquatic Resource

Miller Creek. Miller Creek historically has experienced poor water quality conditions and because of this is of no use as a fishery and is of little value to aquatic resources in the area. Water source investigations completed in July of 1986 indicate a significant contribution of water as base flow originating from the Star Point Sandstone and Blackhawk Formations which contain tongues of Mancos Shale. The Mancos is notoriously bad for causing severe degradation of water quality. In this case significant degradation of water quality occurs in the Right Fork Stream with the inflow from the Star Point and Blackhawk Formations.

There have been minor impacts to the quantity or quality of the water in Miller Creek because of CPMC's undermining of the stream and associated subsidence. Some surface disturbance, caused by subsidence cracks, exist in the upper most portions of the Right Fork of the Miller Creek drainage basin.

This area was mined by CPMC using the longwall mining methods in conjunction with a U.S. Geological Survey study to determine the following: (1) To determine the effects of longwall mining and resulting subsidence on overlying groundwater and surface-water environments in an area where the thickness of the overburden is less than 1000 feet; and (2) To develop methods of determining the hydrologic effects of mining-related land subsidence. The relation between the hydrologic effects of subsidence and certain geologic parameters will be included in the study. These parameters include the variable thickness, strength, stratigraphy, and lithologic character of the rocks overlying the mined areas; the orientation and density of pre-existing joints; and the proximity and

principal strike direction of faults. Documenting the impact on certain hydrologic properties, such as water levels in perched aquifers, water-level gradient in regional aquifers, chemical quality of groundwater in these aquifers, stream flow quantity and quality, and spring discharge quantity and quality, will be included in the evaluation. A complete project proposal for the USGS study is shown as Exhibit 322.220c, Hydrologic Response to Land Subsidence Caused by Underground Coal Mining, Miller Creek Drainage, Carbon County, Utah.

Tie Fork Creek. Water quantity and quality monitoring in both tributary streams feeding Tie Fork Creek over the past five years show no impacts from mining conducted by CPMC. No surface disturbances exist in the drainage basins for either tributary.

Subsidence monitoring above the longwall panels indicate uniform subsidence with no surface disturbances on Hoag Ridge which is contributory to the Gentry Hollow Stream. Based on this, no effects are expected on Wild Cattle Hollow Stream, or the Gentry Hollow Stream when mining extends across the graben to Gentry Ridge.

In Exhibit 322.220b Robert Winget Plateau's Aquatics consultant expressed concern that subsidence could cause a reduction in total flow of Tie Fork Creek. Based on data to date, no effects have been seen of subsidence either on spring flows or stream flows in the area. Continued spring and stream monitoring will document any changes to water quality or quantity affecting aquatic resources.

Aquatic Monitoring Plan

The following sampling schedule will be followed using methodology approved by the Division and the appropriate agencies:

**Table 322.220b
Macroinvertebrate Sampling Schedule**

Site	1993	1994		1995		1997		1998		2001	
	Sept	June	Sept	June	Sept	June	Sept	June	Sept	June	Sept
Wild Cattle Hollow Creek*											
Gentry Hollow/Tie Fork Creek*											
Nuck Woodward Creek											

*Gentry Hollow and Wild Cattle Hollow Creeks combine to form Tie Fork Creek.

Aquatic monitoring reports will be submitted with the Annual Reports to the Division and to the Manti La-Sal National Forest Service. Detailed data can be reviewed within the Annual Report for 1995. Historical sampling data can also be reviewed within previous Annual Reports.

Samples will be taken at the locations shown on Map 322.220a, Wildlife Habitat Map.

322.300. USFWS REVIEW.

This information will have to be provided by the Division.

323. MAPS.

The location of all currently approved reference areas or proposed reference areas for determining revegetation success are depicted on Map 321.100a, Map 321.100b, Map 321.100c, Map 321.100d, or Map 321.100e.

The locations of all locations where environmental data with reference to wildlife are collected including the each identified raptor nest, and the Wildlife Mitigation Area are shown on Map 322.220a. The existence of wildlife habitat in relationship to the various plant community types found within the CPMC permit area can is depicted on the above mentioned map in connection with Map 321.100a.

330. OPERATION PLAN.

CPMC was an existing mining operation before promulgation of the regulations. Every effort to bring the operation into full compliance with the regulations has been expended. All disturbed areas not necessary for use have been seeded with diverse seed mixtures that are compatible with wildlife. New facilities that have been constructed after 1977 have been designed to take wildlife into consideration. Old facilities have been evaluated for their impacts upon wildlife.

New facilities constructed since 1977 have been designed to utilize the least amount of disturbance possible to existing wildlife habitat. Mitigative measures have been undertaken to offset disturbance to mule deer winter range.

Fires will not be used on the permit area unless approved.

Mitigation and Management Plans

Mitigation of mining impacts on and management of wildlife are always considered and the plans for implementation approved prior to any perturbation. These actions often follow one of three general forms: (1) design of facilities and access or transportation modes to minimize impacts, (2)

operation of the mine and associated facilities to minimize impact, and (3) enhancement of wildlife habitat both in the vicinity of and away from the mine in order to mitigate losses that may occur.

Eight sediment ponds and numerous sediment traps constructed to control run-off also hold water which is utilized by wildlife. This is evidenced by deer and other wildlife tracks at pond edges and trap edges throughout the operations area and many sightings of wildlife drinking from ponds. Water quality in the ponds is acceptable to wildlife as is evidenced by looking at quality data of pond sampling. Lastly the two canyons occupied by mining operations have been closed to hunting which creates a "mini-reserve" for wildlife.

To further avoid potential impacts to the ground water system from the shallow surface cracks located in the Miller Creek area, CPMC will inspect the stream channel of the North Fork of the Right Fork of Miller Creek during the season when access is possible (June/July and September/October). Water monitoring at Station ST-1 at the forks below the potential subsidence zone will give an indication of water loss due to subsidence if it occurs. Station ST-1 is included in our water monitoring plan and will be monitored monthly from June through October. If monitoring reveals surface cracks which divert stream flow, CPMC will seal the cracks in the stream channel with bentonite or other environmentally safe materials to effectively prevent water loss.

Mudwater Canyon is a NPDES discharge point source, therefore, analysis of a full suite of trace elements in the water discharged is not available. However, data from monitoring for NPDES parameters has been summarized and analyzed. This information is summarized in Table 330.100a, Mine Water Quality Evaluation for Cattle and Wildlife. The Table lists the recommended EPA standards for wildlife as taken from EPA (1973) and EPA (1976).

As can be seen in Table 330.100a, pH, Iron, and Manganese are well below the EPA standards. Oil & Grease and Total Suspended Solids levels are very low with no potential for adverse effects to cattle and wildlife. Although Total Dissolved Solids (TDS) levels have increased significantly over the past year, the level discharged is still no higher than the receiving stream which is utilized by cattle and wildlife with no adverse effects. We believe the TDS level has peaked and will not become a problem.

As mitigation for wildlife, water discharged from the mine may be utilized as mitigating impacts to springs and/or stream flow lost due to mining in Section 18 beneath the North Fork of the Right Fork of Miller Creek. Details of the method of delivering mine water to the stream channel can be seen in Exhibit 731.122a, Water Rights Mitigation Plan. Details of the plan, which can apply to mitigation for wildlife as well as mitigation for water rights, are as follows: During mining near the stream channel, a horizontal hole can be drilled to the surface near the stream channel bottom. Water from within the mine will gravity flow from the mine to the surface where it will enter the channel. The dip of the coal seam is favorable for this scenario, therefore allowing water inflowing to the mine to collect in the low area where it will flow to the surface.

Data collected in Miller Creek and Tie Fork Creek including both tributaries (Gentry and Wild Cattle Hollow Creeks) of Tie Fork Creek will provide baseline for future impact analysis and mitigation planning if the need arises. Ongoing water monitoring of Miller Creek and both tributaries of Tie Fork

Creek track both water quality and quantity, the major factors in aquatic wildlife population success. If negative impacts to water quality or quantity occur because of mining, additional aquatic wildlife investigations will be conducted to assess the impacts and to guide mitigation efforts.

In new mine operations it is easy to suggest, provide and implement mitigative and management measures, but in the case of the Star Point Mines, which were already in operation when the environmental laws

TABLE 330.100a
Mine Water Quality Evaluation for Cattle and Wildlife

PARAMETERS	UNITS	RECOMMENDED EPA STANDARD	MINE WATER DISCHARGE-MUDWATER CANYON			
			MEAN	STANDARD DEVIATION	MAXIMUM	MINIMUM
Temperature	°C	-	-	-	-	-
Conductivity	umhos/cm	-	-	-	-	-
pH	Standard Units	6.5-9.0	7.533	0.622	8.150	6.950
Total Dissolved Solids	mg/l	Ambient	695.060	181.300	1140.00	366.000
Total Suspended Solids	mg/l	Minimized	<3.774	3.705	19.000	0.050
Iron	mg/l	1 mg/l	0.158	0.153	0.820	0.050
Manganese	ug/l	100 ug/l	<10.000	0.000	<10.000	<10.000
Oil and Grease	mg/l	-	<0.737	0.708	<0.050	<0.050
						33

came into force, preconstruction design and associated mitigation and management does not always apply. The terrestrial wildlife inhabiting and utilizing the area of concern are accustomed to the present facilities and have adjusted their behavior, including migration patterns, so that change would be of more impact than would retaining the status quo. Facilities designed and constructed since 1977 have been designed with wildlife in mind; conveyors have been constructed to allow deer to cross under, power lines have been designed to be raptor proof and other considerations have been given to all wildlife.

The Corner Canyon Fan was constructed with deer and elk reproductive activity in mind. Construction startup was begun after consultation with UDWR personnel. To minimize habitat disturbance and loss, the planned surface disturbed acreage was reduced. The cut-off ditch above the site was seeded with a diverse seed mixture compatible with wildlife.

The Gentry Mountain Air Shaft site will not impact vegetation or wildlife during the life of the mine. The actual disturbed area will be very small, less than a quarter of an acre. The facility will consist of a steel casing about eight inches in diameter enclosed in a below ground steel access chamber. A 550 foot long ancillary road or surface trail will provide access to the site from a preexisting reclaimed road. After the air shaft is completed disturbed areas, including the surface trail, will be reclaimed and replanted using the seed mixture required by the Forest Service. Only the below ground access chamber and air shaft will remain during the life of the mine. During final reclamation the casing will be plugged and the access chamber will be removed.

During a site visit on May 18, 1992, with Forest Service personnel, Bob Thompson, the Forest Service Vegetation Specialist recommended that several currant shrubs from the pad area be transplanted on the east side of the pad area to provide a visual barrier for recreationists viewing the site from the east. CPMC will comply with this suggestion during pad preparation. The shrubs will be transplanted using a backhoe and will be watered when transplanted. The pad disturbance area will be fenced during interim reclamation and will remain fenced until vegetation has been established.

The air shaft will not produce noise or water discharge. The facility will potentially enhance wildlife in the immediate area. The air shaft casing and fence will provide perches for birds in an area that is predominated by low brush.

The refuse pile extension area is proposed for a site within mule deer wintering range. The area will be gradually filled and ultimately covered with topsoil. It is to be reseeded and revegetated with species that are proven for their potential on such sites and their value as winter browse for mule deer and as bird habitat. The most successful methods known to management agencies will be used. Care will be taken to control detrimental wildlife use while the area is stabilizing. Since there will be a time lag between the loss and reestablishment of the disturbed winter range, enhancement of winter range in proximity to that lost was conducted to accommodate the displaced animals. Details of these mitigation measures are discussed in-Section 341.300.

In summary, in 1982 approximately 20 acres in mule deer winter range was enhanced by removing and knocking down mature brush, pinyon and juniper trees to promote new growth of shrubs. The

area was seeded with a diverse seed mixture compatible with deer usage. In 1983, containerized shrubs were hand planted consisting of the following:

<u>Species</u>	<u>No. Planted</u>
Fourwing Saltbush	500
Bitterbrush	1,000
Serviceberry	700
Currant	300
Mormon Tea	500
True Mountain Mahogany	500

Data from vegetation monitoring in 1985 as submitted to the Division shows that total forage production, perennial and annual forbs increased in the mitigation area, as compared to the control area. In addition, species richness is higher than that of the control area.

In addition to vegetation enhancement, a guzzler was installed at the mitigation area to provide water for deer utilizing the area. The guzzler was installed after ponds constructed for the same purpose in a natural drainage silted full and failed during heavy rainfall shortly after construction.

Mule deer historically have a difficult time wintering when snow depth is excessive or persistent as in 1977-78. Although it would be desirable to only dump refuse when mule deer are on their summer range, it is not feasible. Care will be taken, however, to minimally disturb wintering animals. Vehicles will be restricted to established roads.

Construction of the Unit Train Project disturbed only minimal amounts of vegetation in mule deer winter range. The mitigation area discussed above also provides forage for deer utilizing this area. Since the mitigation area was treated and seeded in 1982-1983, disturbance to the Unit Train Area (1985) was offset. In other words, vegetation enhancement was in place to offset disturbance during critical deer usage.

Overland conveyors feeding the Unit Train facilities were designed and constructed utilizing the UDWR recommended minimum clearance beneath the structure to allow deer crossing.

Sediment ponds and sediment traps have been constructed, all of which provide water through much of the year for deer and other wildlife. Five of these ponds are in deer winter range and one more is very close to the upper range limit as defined by UDWR and thus is utilized in some winters. These water sources extend the winter range for deer and enhance the overall ecosystem in the area for all forms.

The suitability of the waters in the sedimentation ponds for wildlife are summarized in Table 330.100c, Sedimentation Pond Water Quality Evaluation for Wildlife. This table was prepared by comparing natural waters from station 10-1 in Sagebrush Canyon, a sampling point below treatment facility No. 1 and sedimentation ponds No. 2 and 3, which are listed as ambient and the waters in the sedimentation ponds that are monitored for the NPDES monitoring program, are listed in Table 330.100c as pond waters. The values from station 10-1 essentially represent drainage from

undisturbed areas while the values from the sedimentation ponds represent drainage from areas disturbed by mining. Table 330.100c also contains the Recommended EPA standards for wildlife as taken from EPA (1973) commonly referred to as the EPA Blue Book and EPA (1976) commonly referred to as the EPA Red Book. These two references have long been accepted as standards used in water quality evaluations.

This comparison indicates that the parameters; temperature, conductivity, total dissolved solids and total suspended solids have no recommended standards for wildlife applicable to this Comparison. The parameters; pH, Arsenic, Barium, Chromium, and Lead, all have ambient values below the EPA recommended thresholds so cannot reasonably be suspected as posing any sort of a problem to wildlife. Iron and manganese values in the ambient waters exceed the recommended EPA thresholds but all sedimentation pond waters have values significantly lower than the ambient values suggesting that the sediment trapping ability of the ponds significantly, lowers total dissolved solids, suspended solids and associated heavy metal values. All Iron values sampled in the sedimentation ponds are below the EPA standard so CPMC believes that waters in the ponds are therefore acceptable with respect to Iron. Sixteen of the eighteen Manganese values are also below the EPA standards. Upon comparison of the manganese values obtained from the ambient values reported in Table 330.100b, CPMC believes that the values obtained from the sedimentation ponds are considerably cleaner than are the ambient manganese values in this area. We also believe that it is important to point out that the EPA Red Book mentions this standard in connection with "protection of consumer of marine mollusks." Since the EPA Red book states that "manganese is not considered to be a problem in fresh waters." The explanation given is that permanganates are rapidly oxidized and are rendered nontoxic. Since the Red Book states that "manganese is not known to be a problem in water consumed by livestock" and that no specific critter on is set for agricultural waters. CPMC believes that manganese poses little potential threat to wildlife.

Cadmium according to the data resented in Table 330.100b, potentially poses a threat to wildlife. A comparison of these cadmium values with those reported in Exhibit 724.100a, Surface Water Quality Summary, tend to indicate that ambient levels of cadmium in Corner Canyon and Mudwater Canyon are similar to those encountered at station 10-1. Since the sedimentation pond waters have lower suspended and dissolved solids and associated metal values for the parameters measured, CPMC believes that the actual potential of an adverse impact from elevated cadmium are highly unlikely. CPMC suggests that this evaluation of the water quality of waters in the sedimentation ponds strongly suggests that the waters in these ponds are of suitable water quality for wildlife. CPMC believes that accessibility into the sedimentation ponds should be as good, if not better than natural waters in this area, due to the fact that specific engineering standards were used during the construction of these ponds with slopes usually flatter than those normally found in the area. CPMC also believes that due to the history of mining in the area and apparent adjustment of wildlife to the operators that no access problems should be expected. Documented use of the ponds by deer proves that the wildlife in this area have seemingly adjusted to man's activities in this area.

Since no riparian habitats exist within the area of surface disturbance, there will be no impact by the proposed action. All water is ephemeral (class 6), but since water is such a limiting resource to game animals, care will be taken to prevent disturbance, erosion, or coal deposition in the ephemeral channels. Roads will be routed or acceptable crossings built to avoid disturbance or erosion.

If the mining operation should require structures that would present a potential barrier to daily or seasonal movements of wildlife, adequate passage structures will be constructed.

As determined in consultation with UDWR, all hazards associated with the mine operation will be covered, buffered or fenced to prevent damage to wildlife of concern.

When conclusive findings are made that mining by CPMC has caused impacts to water quality or quantity in a way that impacts wildlife, CPMC will mitigate those impacts. Mitigation measures will be determined in conjunction with the Division, Land Management Agency, UDWR, and water rights owners. Mitigation measures will be determined considering available technology which may include: developing other springs in the vicinity to increase their flow to offset impacted sources, installing water guzzlers to offset water lost or other measures as determined feasible to replace or mitigate the impacted supply.

TABLE 330.100b
Sedimentation Pond Water Quality Evaluation for Wildlife

PARAMETERS	UNITS	AMBIENT					RECOMM. EPA STANDARD	SEDIMENTATION POND				
		MEAN	S.D.	MAX.	MIN.	N.		MEAN	S.D.	MAX.	MIN.	N.
Temperature	Degrees C	9.000	7.782	22.000	2.000	8	-	-	-	-	-	
Conductivity	umhos/cm	2897.071	1122.968	5100.000	970.000	14	-	-	-	-	-	
pH	pH	7.675	0.323	8.110	7.100	14	6.5-9.0	7.300	0.574	8.600	6.400	
Total Dissolved Solids	-	2184.928	844.879	3340.000	689.000	14	Ambient	847.111	389.887	1564.000	350.000	
Total Suspended Solids	mg/l	386.615	718.364	2682.000	8.000	13	Minimized	42.333	80.598	362.000	4.000	
Arsenic	mg/l	1.000	0.000	< 1.000	< 1.000	3	50ug/l	-	-	-	-	
Barium	ug/l	< 100.000	0.000	< 100.000	< 100.000	3	100ug/l	-	-	-	-	
Cadmium	ug/l	< 11.333	10.969	24.000	< 5.000	3	0.4ug/l	-	-	-	-	
Chromium	ug/l	< 50.000	0.000	< 50.000	< 50.000	3	100ug/l	-	-	-	-	
Lead	ug/l	< 50.000	0.000	< 50.000	< 50.000	3	50ug/l	-	-	-	-	
Mercury	ug/l	< 0.157	0.084	< 0.200	0.030	4	.05ug/l	-	-	-	-	
Iron	mg/l	8.780	20.409	55.500	< 0.050	13	1 mg/l	<1.238	0.152	0.640	< 0.050	
Manganese	ug/l	155.620	307.540	1130.000	11.000	13	100ug/l	45.000	36.000	130.000	< 10.000	

In any situation not previously mentioned where wildlife habitats are disturbed by this proposed action, reclamation will be implemented by the best available methods and agreeable to UDWR and the appropriate land management agencies.

Employee Awareness and Wildlife

Since there are crucial critical periods in the life history of high interest species such as mule deer and elk, the applicant will communicate such to their employees who will be admonished to avoid all unnecessary disturbance and harassment of wildlife species.

Periodically, all CPMC personnel are required to have presented to them a slide/tape presentation entitled "Coal Mining and Wildlife" which was developed jointly by CPMC and the UDWR. The object of this presentation is to spark awareness in CPMC personnel of wildlife and the effects of mining on that wildlife resource. In addition, personnel are instructed on procedures related to high interest species.

All surface areas except water surface areas, roads, parking lots, buildings, refuse piles and other operations facilities have been seeded with diverse seed mixtures compatible with wildlife. In addition, approximately 30,000 shrub seedlings have been planted throughout the disturbed areas to provide forage and habitat for wildlife.

No threatened or endangered species are currently known to exist within the permit area. If any are identified, every effort will be made to prevent disturbance. CPMC personnel are periodically instructed concerning wildlife in the area in an effort to minimize impacts.

Annual raptor surveys are conducted to study the effects of the operation on birds of prey in the area. These surveys cover the entire permit area, and as such go beyond the letter of the law. CPMC cooperatively conducts these surveys with the UDWR to enhance general knowledge about this valuable resource.

Two possible riparian areas exist within 100 feet of existing facilities. These areas are the Mud Water Canyon Fan and the Corner Canyon Fan. Neither of the streams are classified as fisheries. Regular inspections at both sites will insure that the possible riparian areas are not harmed. Water discharged from the mine at the Mud Water Canyon Fan area is regulated by the NPDES program. Water quality must meet the requirements of EPA, the Utah State Health Department and the Division, insuring no degradation

of the receiving stream. No water is discharged from Corner Canyon. It is likewise believed that the Little Park Canyon site will be dry as well.

Downstream monitoring at Station 5-1 on Mud Water Creek and Station 36-1 on Corner Canyon Creek documents potential impacts to water flow and quality.

Cliffs exist in the area which are utilized by raptors. Annual searches are made of these cliff faces for evidence of raptor nesting. Mining beneath two golden eagle nests on a cliff face in Section 18, T15S. R8E (No.'s 20 and 21) may cause subsidence as predicted in Exhibit 525.120a, Prediction of

Subsidence Due to Two-Seam Longwall Mining in Section 18 and as revised on Figures 525.120a, and 525.120b..

Golden eagles nesting activity, and cliff movement as a result of mining will be monitored and mitigated according to the plan detailed in Exhibit 342.100a, Golden Eagle Cliff Nesting and Subsidence Monitoring and Mitigation Plan. The only information available that CPMC could find on the effects of mining on cliff faces and eagle nests was a monitoring report from Utah Power and Light Mining Company for the year 1986. UP&L Mining Company has long wall mined beneath the Castlegate Sandstone cliff face in Newberry Canyon at the Cottonwood-Wilberg Mine. Their data shows some movement of the cliff and spalling of cliff face. Conditions at the UP&L site are vastly different from those at CPMC and little correlation or prediction of mining effects can be made at CPMC at this time.

No wetlands or riparian areas exist in the vicinity of surface operations, except as noted above.

Stream Buffer Zones

Only one disturbed area exists in proximity to a stream, and this stream is intermittent. This area is the Corner Canyon Fan Breakout. Because of the sensitivity of the area and because water has been flowing in the channel in the past few high precipitation years, CPMC committed to marking the channel as a buffer zone, although, no aquatic resources have been determined to exist in the stream.

No permanent or intermittent aquatic systems occur in the vicinity of any existing or planned surface facilities for CPMC's Star Point Mines. Current surface facilities are in the upper reaches of the Serviceberry Creek drainage, which is a tributary of the Miller Creek drainage. Appropriate sedimentation ponds have been constructed. This coupled with coal refuse pile drainage ditches, clear water diversions, water bars, and wind erosion control measures within CPMC's disturbed areas, will assure protection from mining impact of aquatic resources far downstream from the mine.

332. IMPACTS OF SUBSIDENCE

The impacts of subsidence are discussed in Sections 322, and 330, and in Exhibit 342.100a. The discussions concerning subsidence referenced here are applicable to both the Gentry Ridge and Castle Valley Ridge areas. These areas are contiguous and have the following common characteristics:

- 1) The topographies of both areas are similar.
- 2) Both areas consist of the same stratigraphic sections and rock types.
- 3) The same coal seam will be mined in both areas.
- 4) The same mining methods will be used in both areas.
- 5) Vegetation in both areas is similar.
- 6) Wildlife in both areas is similar.

In addition, in the Castle Valley Ridge Tract the mine plan is designed to protect perennial streams from subsidence. The impact due to subsidence in the Castle Valley Ridge Tract is expected to be similar to subsidence impacts in the Gentry Ridge Tract.

Vegetation monitoring on U. S. Forest Service property will be monitored by color infrared photography and by visual observations as discussed Section 500 of this permit document.

Infrared photography for the years 1980 and 1993 were evaluation for vegetation changes due to mining. The evaluation performed by Mr. Paul West of JBR Consultants Group noted possible changes in vegetation at 11 locations, none of which were considered significant since no location encompassed more than 4 acres. Several possible explanation for changes were: insect damage, disease, ground subsidence, groundwater alterations, and weather conditions (precipitation and snow coverage). Another probable explanation was that in the 1980 photographs the trees had leaves, whereas in 1993 photographs the trees were without leaves. The evaluation was submitted to DOGM in the 1993 Annual Report.

333. FISH AND WILDLIFE PLAN.

ACTIONS TAKEN TO MINIMIZE IMPACTS TO WILDLIFE

All disturbed areas not necessary for use have been seeded with diverse seed mixtures that are compatible with wildlife. New facilities that have been constructed after 1977 have been designed to take wildlife into consideration. Old facilities have been evaluated for their impacts upon wildlife. Mitigative measures have been undertaken to offset disturbance to mule deer winter range.

The Division shall be notified of the presence of any critical habitat of a threatened or endangered species listed by the Secretary or any plant or animal listed as threatened or endangered by state or any bald or golden eagle not previously reported within the permit area.

Roads have been located to minimize impacts to wildlife and speed limits have been reduced to reduce possible impacts to wildlife. The roads do not create barriers to wildlife movement.

The only stream channel near a disturbed area with a potential for aquatic resources is in Corner Canyon near the fan breakouts. No disturbance of the channel was made by the fan construction. The stream has been marked with a buffer zone sign.

Pesticide use is not planned; the Division as well as other appropriate agencies will be consulted for approval should uses be necessary. Fires will not be used on the permit area unless approved.

Plant species for reclamation have been and will be chosen for their nutritional value, cover characteristics and their ability to support and enhance fish and wildlife habitats. Plantings will be grouped and distributed in a manner which optimizes edge effect, cover and other benefits to wildlife.

Enhancement of wildlife habitat in the operations area has been accomplished in the several ways. Interim revegetation has been conducted on all disturbed sites whenever possible using with basically introduced species which have proven value to wildlife. These species usually "green-up" earlier than native species, are more nutritional than native species, and add more diversity in mix than native species.

Eight sediment ponds, one treatment facility, and numerous sediment traps constructed to control run-off also hold water which is utilized by wildlife. This is evidenced by deer and other wildlife tracks at pond edges and trap edges throughout the operations area and many sightings of wildlife drinking from ponds. Water quality in the ponds is acceptable to wildlife as is evidenced by looking at quality data of pond sampling. Lastly the two canyons occupied by mining operations have been closed to hunting which creates a "mini-reserve" for wildlife.

Mitigation and Management Plans

Mitigation of mining impacts on and management of wildlife are always considered and the plans for implementation approved prior to any perturbation. These actions often follow one of three general forms: (1) design of facilities and access or transportation modes to minimize impacts, (2) operation of the mine and associated facilities to minimize impact, and (3) enhancement of wildlife habitat both in the vicinity of and away from the mine in order to mitigate losses that may occur. For additional information refer to Section 330.

In the aquatic inventories performed by the USFS no substantial deterioration of aquatic resources was noted in the inventories for Nuck Woodward Creek in 1993 - 1995, for Gentry Creek in 1994, or for Wild Cattle Hollow Creek in 1994. The aquatic inventories are included in the CPMC Annual Reports for the corresponding years.

The terrestrial wildlife inhabiting and utilizing the area of concern are accustomed to the present facilities and have adjusted their behavior, including migration patterns, so that change would be of more impact than would retaining the status quo. - Conveyors have been constructed to allow deer to cross under, power lines have been designed to be raptor proof and other considerations have been given to all wildlife.

In 1982 approximately 20 acres in mule deer winter range was enhanced by removing and knocking down mature brush, pinyon and juniper trees to promote new growth of shrubs. The area was seeded with a diverse seed mixture compatible with deer usage. In 1983, containerized shrubs were hand see also Section 330).

Employee Awareness and Wildlife

Periodically, all CPMC personnel are required to have presented to them a slide/tape presentation entitled "Coal Mining and Wildlife". The object of this presentation is to spark awareness in CPMC

personnel of wildlife and the effects of mining on that wildlife resource. For additional discussion of employee awareness programs see Section 330.

Stream Buffer Zones

Refer to Section 330.

340. RECLAMATION PLAN.

The objective of the proposed backfilling, contouring, grading and seeding/mulching process is to achieve a reclaimed surface which will provide a variety of topographic features enhancing the postmining land use. The premining topography in the area contains long steep slopes with numerous natural benches. The backfilling plan includes leaving modified cutslopes and the associated benches. The postmining topography is graphically represented on Maps 542.200a through 542.200i. For additional discussion refer to the engineering Reclamation Plan located in Section 540.

The refuse pile will be reclaimed according to the plan shown in Exhibit 528.322d.

341. REVEGETATION.


CPMC has long had a commitment toward ensuring that all areas disturbed in connection with mining are returned to a postmining configuration which would allow these lands to be used in a similar manner to adjacent lands which are not disturbed. The following discussion specifically addresses how this will be accomplished for each disturbed area within the CPMC Permit Area.

341.100. SCHEDULE OF REVEGETATION.

Revegetation efforts will be initiated following the backfilling and regrading activities described in response to Section 540 and detailed on Table 542.100a have been completed. Following regrading, the site will be deep gouged or similarly scarified treated to assure that redistributed topsoil forms a good bond with the regraded landscape. This roughened state will aid in reducing the possibility of slippage occurring at the spoil-topsoil interface. The roughness of this bond will promote moisture retention and tend to increase root penetration.

Topsoil reapplication will be conducted whenever conditions allow for safe operation of equipment on the site. Based upon research conducted in the Northern Great Plains (Gee and Bauer, 1976) and in Wyoming (Miller and Cameron, 1976), CPMC does not anticipate compaction of redistributed topsoil posing a problem for revegetation efforts except when very moist soils are being handled. These studies document that compaction of stockpiled topsoils is largely alleviated as the materials are respread. To the extent that conditions allow, redistribution of topsoil will be conducted along the slope to reduce the possibility of surface runoff. As soon as possible following topsoiling and as

TABLE 341.100a: STAR POINT MINE REVEGETATION TIMETABLE

Name	January	February	March	April	May	June	July	August	September	October	November
Order seed, seedlings, mulch											
Backfilling & Regrading											
Gouging, seedbed prep.											
Fertilization											
Seeding											
Mulching											
Planting seedlings											
Final preparations											

Cyrus Plateau Mining Company

Milestone

Summary



Time Frame



conditions allow, the respread topsoil will be contoured. These activities will be conducted parallel to the slope contours.

A schedule for revegetation has also been prepared to show the sequential order in which the revegetation techniques to be done subsequent to backfilling, grading, topsoiling, and deep gouging will be employed (Table 341.100a).

341.210. SEEDING AND TRANSPLANTING RATES.

Following completion of topsoiling and seedbed preparation, reseeding activities will commence. Sites level enough to be safely traversed with equipment will perhaps be drilled, broadcast, or hydroseeded using seed mixtures recommended for the reclaimed areas. These mixtures have been created with an array of species that are adapted to a variety of environmental and physiognomic conditions for plant communities specific to the permit area. In other words, the strategy is that the mixture is diverse enough to enable adequate cover, density, productivity and species diversity on all slopes, exposures, soils conditions, etc. of the reclaimed areas. It is expected that with the diversity in the seed mixtures, certain species will do better in some areas, whereas, other species will be better adapted and consequently become better established in other areas where environmental variables may be somewhat different.

It is expected that most areas will be broadcast seeded to maintained the integrity of the deep gouges and scarification implemented as seedbed preparations. If, however, areas are drill seeded they will be seeded at a rate of one-half the rate recommended for broadcast seeding. All areas to be broadcast seeded will be seeded at rates that provide coverage ranging from approximately 100 to 150 pure live seeds per square foot. Areas to be drill seeded will contain between 50 to 75 pure live seeds per square foot. Specific seeding and planting rates for each area are shown in the following section (341.220).

341.220. PLANTING/SEEDING METHODS & AREAS.

As mentioned in 341.210 above, most areas will be broadcast seeded. The mine to be reclaimed has been divided into four areas to be seeded. These areas are referred to by names used to describe the general (or dominant) vegetation types and the seed mixtures that will be used at the time of final reclamation. These areas are:

- 1) Saltbush Area,
- 2) Sagebrush Area,
- 3) Mountain Grassland Area,
- 4) Forest Service Areas.

The areas are briefly described below along with seeding and planting rates.

Saltbush Area

This area is the site of the Unit Train Loadout and areas near the conveyor and other structures associated with it. The disturbance has been made in Mancos Shale slopes and was done post-SMCRA. The revegetation seed mix for this area is given on Table 341.220a. Woody plants to be transplanted are shown on Table 341.220b. The area is delineated on Map 321.100h.

TABLE 341.220a Revegetation Seed Mix			
SALTBUSH AREAS			
Scientific Name	Common Name	LBS PLS/Ac	No. of PLS/ft ²
Shrubs			
<i>Atriplex canescens</i>	Fourwing saltbush	4.00	5.05
<i>Atriplex confertifolia</i>	Shadscale	4.00	5.88
<i>Atriplex corrugata</i>	Mat Saltbush	3.00	4.13
<i>Atriplex cuneata</i>	Castle Valley Saltbush	5.00	3.48
<i>Ceratoides lanata</i>	Winterfat	4.00	5.05
Forbs			
<i>Linum lewisii</i>	Lewis flax	2.00	12.76
<i>Medicago sativa</i>	Alfalfa	2.00	9.64
<i>Mellilotus officinalis</i>	Yellow sweetclover	2.00	11.94
<i>Sphaeralcea coccinea</i>	Globemallow	1.00	11.48
Grasses			
<i>Agropyron cristatum</i>	Crested wheatgrass	2.00	9.18
<i>Elymus trachycaulus</i>	Slender wheatgrass	4.00	14.69
<i>Elymus lanceolatus</i>	Thickspike wheatgrass	4.00	14.14
<i>Elymus elymoides</i>	Squirreltail	2.00	8.82
<i>Stipa comata</i>	Needle-and-thread	4.00	10.56
<i>Stipa hymenoides</i>	Indian ricegrass	2.00	8.63
TOTALS		45.00	135.43

TABLE 341.220b Transplanted Species		
SALTBUSH AREAS		
Scientific Name	Common Name	Number/Ac
<i>Atriplex canescens</i>	Fourwing saltbush	100
<i>Atriplex confertifolia</i>	Shadscale	100
<i>Ceratoides lanata</i>	Winterfat	100
TOTAL		300

Sagebrush Area

The majority of the disturbed areas at the Star Point Mine site are located in an area referred to as the Sagebrush Area. This area has also been called the "Wattis Area" and includes the refuse pile, topsoil stockpile, lower office area, wash plant conveyor, rail spurs in this area, Pond 4, Pond 5, Pond 6 Pond 7, and the CMP Ditch. The areas to be reclaimed are nearly equally represented by both pre-SMCRA and post-SMCRA disturbances. These areas are shown on Map 321.100h. The seed mix to be used for final revegetation is shown on Table 341.220c, whereas, the transplanted species are shown on Table 341.220d.

TABLE 341.220c: Revegetation Seed Mix SAGEBRUSH AREAS			
Scientific Name	Common Name	LBS PLS/Ac	No. of PLS/ft ²
Shrubs			
<i>Amelanchier utahensis</i>	Serviceberry	6.00	3.55
<i>Artemisia tridentata</i> var wyo.	Sagebrush	0.10	5.91
<i>Atriplex canescens</i>	Fourwing saltbush	5.00	6.31
<i>Ceratoides lanata</i>	Winterfat	6.00	7.58
<i>Cercocarpus ledifolius</i>	Mtn. Mahogany	8.00	5.51
<i>Chrysothamnus nauseosus</i>	Whitestem rabbitbrush	0.40	3.67
Forbs			
<i>Achillea millefolium</i>	Yarrow	0.10	6.36
<i>Artemisia ludoviciana</i>	Louisiana Sagewort	0.10	10.33
<i>Aster chilensis</i>	Pacific aster	0.10	5.97
<i>Hedysarum boreale</i>	North sweetvetch	8.00	6.17
<i>Linum lewisii</i>	Lewis flax	2.00	12.76
<i>Melilotus officinalis</i>	Yellow sweetclover	1.00	5.97
<i>Penstemon palmeri</i>	Penstemon	1.00	14.00
<i>Sphaeralcea coccinea</i>	Globeamallow	1.00	11.48
Grasses			
<i>Agropyron cristatum</i>	Crested wheatgrass	1.00	4.59
<i>Elymus lanceolatus</i>	Thickspike wheatgrass	3.00	10.61
<i>Elymus spicatus</i>	Bluebunch wheatgrass	3.00	9.64
<i>Elymus elymoides</i>	Squirreltail	2.00	8.82
<i>Stipa comata</i>	Needle-and-thread	3.00	7.92
<i>Stipa hymenoides</i>	Indian ricegrass	2.00	8.63
TOTALS		52.40	155.79

TABLE 341.220d Transplanted Species SAGEBRUSH AREAS		
Scientific Name	Common Name	Number/Ac
<i>Atriplex canescens</i>	Shadscale	100
<i>Ceratoides lanata</i>	Winterfat	100
<i>Cercocarpus ledifolius</i>	Mtn. Mahogany	100
TOTAL		300

Mountain Grassland Area

As one begins to gain elevation at the mine site and located especially on the more north and northeast exposures, the native plant communities change from Sagebrush to more Mountain Grassland and Douglas Fir communities. When reclaimed, disturbances in these areas will be seeded with a seed mixture developed specifically for them. The seed mixture is shown on Table 341.220e and the transplants are shown on Table 341.220f. The area to be seeded and planted as Mountain Grassland begins west of the Sagebrush Area near the point where the haul road of the old Star Point No. 1 Mine begins. The area therefore includes the old haul road, the Star Point No. 1 Mine area, Pond 2 area, the conveyor area, and the Lion Deck Portal area.

TABLE 341.220e: Revegetation Seed Mix			
MTN. GRASSLAND AREAS			
Scientific Name	Common Name	LBS PLS/Ac	No. of PLS/ft ²
Trees/Shrubs			
<i>Amelanchier utahensis</i>	Serviceberry	6.00	3.55
<i>Artemisia tridentata</i> var. <i>vasey</i>	Vasey sagebrush	0.10	5.74
<i>Cercocarpus ledifolius</i>	Mtn. Mahogany	8.00	5.51
<i>Chrysothamnus nauseosus</i>	Whitestem rabbitbrush	0.40	3.67
<i>Symphoricarpos oreophilus</i>	Snowberry	4.00	6.89
Forbs			
<i>Achillea millefolium</i>	Yarrow	0.10	6.36
<i>Aster engelmannii</i>	Engelman aster	2.00	9.18
<i>Hedysarum boreale</i>	Northern sweetvetch	8.00	6.17
<i>Linum lewisii</i>	Lewis flax	2.00	12.76
<i>Penstemon palmeri</i>	Penstemon	1.00	14.00
Grasses			
<i>Bromus carinatus</i>	Mtn. Brome grass	4.00	9.18
<i>Elymus cinereus</i>	Gt. Basin wildrye	4.00	8.72
<i>Elymus lanceolatus</i>	Thickspike wheatgrass	4.00	14.14
<i>Elymus spicatus</i>	Bluebunch wheatgrass	4.00	12.86
<i>Poa secunda</i>	Sandberg's bluegrass	0.40	8.49
<i>Stipa hymenoides</i>	Indian ricegrass	3.00	12.95
<i>Stipa lettermanii</i>	Letterman's needlegrass	3.00	10.33
TOTALS		51.00	140.19

TABLE 341.220f Transplanted Species		
MTN. GRASSLAND AREAS		
Scientific Name	Common Name	Number/Ac
<i>Purshia tridentata</i>	Bitterbrush	100
<i>Cercocarpus ledifolius</i>	Mtn. Mahogany	100
<i>Pseudotsuga menziesii</i>	Douglas Fir	100
TOTAL		300

Forest Service Areas

Also included in the revegetation will be small, localized disturbances made for fan and shaft portals. These disturbances were relatively small (from .25 to .45 acres) and located on USDA Forest Service land. Included in these areas were the Corner Canyon Fan, Mudwater Canyon Fan, and Gentry Mountain Shaft sites. The areas are located in Aspen, Mountain Shrublands, and Douglas Fir communities. These areas will be seeded and planted with woody species according to specifications prepared by the Forest Service. The lists are shown on Tables 341.220g through 341.220j.

TABLE 341.220g: Revegetation Seed Mix*			
FOREST SERVICE AREA GENTRY MTN.			
Scientific Name	Common Name	LBS PLS/Ac	No. of PLS/ft ²
Shrubs			
<i>Rosa woodsii</i>	Wood's rose	4.00	4.16
<i>Symphoricarpos oreophilus</i>	Snowberry	4.00	6.89
Forbs			
<i>Achillea millefolium</i>	Yarrow	3.00	190.77
<i>Hedysarum boreale</i>	Utah Sweetvetch	4.00	3.09
Grasses			
<i>Alopecurus pratensis</i>	Meadow foxtail	3.00	39.94
<i>Bromus inermis</i>	Manchar smooth brome	3.00	8.61
<i>Dactylis glomeratus</i>	Orchardgrass	3.00	45.04
<i>Elymus hispidus</i>	Intermediate wheatgrass	2.00	4.27
<i>Elymus spicatus</i>	Bluebunch wheatgrass	4.00	12.86
<i>Elymus trachycaulus</i>	Slender wheatgrass	4.00	14.69
<i>Festuca rubra</i>	Red fescue	3.00	34.44
<i>Phleum pratensis</i>	Timothy	3.00	89.53
<i>Poa pratensis</i>	Kentucky bluegrass	2.00	99.95
TOTALS		42.00	554.24

* Seed mix recommended by the U.S. Forest Service and based on research conducted at the Research Station at Ephraim and Logan, Utah.

TABLE 341.220h Transplanted Species			
FOREST SERVICE AREAS (GENTRY MOUNTAIN)			
Scientific Name	Common Name	Gentry Mtn.	Number/Ac
<i>Cercocarpus ledifolius</i>	Mtn. Mahogany	x	350
TOTALS			350

* Rates and species selected to satisfy U.S. Forest Service stipulations.

TABLE 341.220i: Revegetation Seed Mix*			
FOREST SERVICE AREAS (MUDWATER & CORNER CANYON)			
Scientific Name	Common Name	LBS PLS/Ac	No. of PLS/ft ²
Forbs			
<i>Aster chilensis</i>	Pacific aster	0.20	11.94
<i>Geranium viscosissimum</i>	Sticky geranium	1.00	1.19
<i>Lupinus alpestris</i>	Mtn. lupine	1.00	0.29
<i>Medicago sativa</i>	Alfalfa	1.50	7.23
<i>Osmorhiza occidentalis</i>	Sweet anise	1.00	0.68
<i>Vicia americana</i>	American vetch	1.00	0.46
Grasses			
<i>Bromus carinatus</i>	Mtn. brome	6.50	14.92
<i>Elymus trachycaulus</i>	Slender wheatgrass	4.80	17.63
<i>Phleum alpinum</i>	Timothy	1.00	22.96
<i>Poa pratensis</i>	Kentucky bluegrass	1.00	49.98
TOTALS		19.00	127.28

* Seed mix recommended by the U.S. Forest Service and based on research conducted at the Research Station at Ephraim and Logan, Utah.

TABLE 341.220j: Transplanted Species				
FOREST SERVICE AREAS (MUDWATER & CORNER CANYON)				
Scientific Name	Common Name	Mud- water	Corner Canyon	Number/Ac
<i>Populus tremuloides</i>	Aspen	x	x	169
<i>Pseudotsuga menziesii</i>	Douglas Fir	x	x	168
<i>Sambucus racemosa</i>	Elderberry	x	x	141
<i>Symphoricarpos oreophilus</i>	Snowberry	x	x	141
TOTALS				619

* Rates and species selected to satisfy U.S. Forest Service stipulations.

Topsoil Stockpile/General Interim Seed Mixture

A interim seed mixture to be used in areas that are to be temporarily seeded or redisturbed prior to final reclamation is given on Table 341.220k. This seed mixture should provide a quick-growing ground cover that protects the seeded area by stabilizing the soil thus minimizing erosion by wind and water.

TABLE 341.220k: Topsoil Stockpile/General Interim Seed Mix			
INTERIM SEEDED AREAS			
Scientific Name	Common Name	LBS PLS/Ac	No. of PLS/ft ²
Forbs			
<i>Medicago sativa</i>	Dryland alfalfa	4.00	19.28
<i>Mellilotus officinalis</i>	Yellow sweetclover	2.00	11.94
Grasses			
<i>Agropyron cristatum</i>	Crested wheatgrass	2.00	9.18
<i>Bromus inermis</i>	Smooth brome	2.00	5.74
<i>Elymus lanceolatus</i>	Thickspike wheatgrass	3.00	10.61
<i>Elymus smithii</i>	Western wheatgrass	2.00	5.79
<i>Elymus elymoides</i>	Squirreltail	2.00	8.82
<i>Elymus junceus</i>	Russian wildrye	2.00	8.03
<i>Elymus hispidus</i>	Thickspike wheatgrass	4.00	8.54
TOTALS		23.00	87.93

341.230. MULCHING.

Two previous mulching studies have been implemented by CPMC to test the effectiveness of various kinds and application rates of mulches. In 1980, Native Plants established three test plot areas to compare the effectiveness of mulching on plants. Results from this study have been presented to Division, originally in 1981 as Appendix 9I in the existing permit application and in the 1983 Annual Reclamation Report.

Prior to the application of reclamation seed mixes, hay and/or straw mulch (2 tons per acre), or other suitable substitute will be incorporated into the growth media. Incorporation of the mulch will occur either by plowing along the contour, deep gouging, or a combination of these methods. An additional layer of hay\straw mulch (1.5 - 2 tons per acre) will be applied atop the incorporated seed mixture. The mulch will be spread using chopper and blowers or hand spread. The final mulch cover will be either crimped or sprayed with a tackifier.

Once the growth media are emplaced and either after or during incorporation of the initial mulch, the surface soil will be gouged. It is recognized that this deep gouging process may extend below the thickness of the growth media, however the materials beneath are neither acid- nor toxic-forming (Chapter 2). Preparation of the rough-graded surface, placement of the growth media and media thicknesses are discussed in Section 240.

Mulching may be used for critical site stabilization where stabilization poses a potential problem. If mulching is necessary, CPMC will apply weed free straw mulch, native hay mulch or wood fiber hydromulch.

Erosion netting may be used as an aid to soil, seed, and moisture retention. Installation and maintenance of the erosion netting will be dependent upon type, branch and field conditions.

341.240. IRRIGATION.

CPMC has no plans to use irrigation in the revegetation of any areas proposed for reclamation in the CPMC Permit Area. Past experience with reclamation has not encountered a need to implement pest and disease control measures to achieve successful reclamation and at the present time, no such need is anticipated. In the event that such a need develops to control pest or disease, CPMC will contact the Utah State University Extension Office for appropriate treatment measures. Upon receipt of proposed control measures, CPMC will send appropriate notification to the Division.

341.300. RECLAMATION STUDIES.

PAST AND PRESENT RECLAMATION STUDIES

Numerous test plots have been constructed or evaluated by CPMC since 1980 to evaluate various aspects of the reclamation program. The location of each of these test plots is shown on the three sheets of Maps 222.100c through 222.100e. Studies completed by CPMC to satisfy various agency and company concerns include: the 1980 Native Plants Test Plots, the 1982 Mulch Study Plots, the 1982 Refuse Study Test Pots, and the 1982 Wildlife Mitigation Study Area.

1980 Native Plants Test Plots

These were the first series of test plots established at CPMC. They were established in October, 1980 at three sites: on the refuse pile, in the borrow area adjacent to the overland conveyor and on the steep fill slope immediately south of the Lion Deck Office. The experimental design of these studies was previously submitted to the Division as Appendix 9B, Test Plot Experimental Design, found in Volume III of Permit ACT/007/006 submitted in 1981. The basic treatments involved seeding various rates of grass, forbs and shrubs, shrub transplanting techniques and mulching practices.

First growing season results were presented in Appendix 9I, Experimental Test Plot Studies at Star Point Mine, Wattis, Utah, found in Volume II of Permit ACT/007/006 submitted in 1981.

Third growing season results from these plots were collected by Getty Mining Company personnel in July of 1983. All plots were evaluated with the exception of the Refuse Test Plot which had been destroyed due to expansion of the Refuse Pile. A complete summary of the 1983 data was presented to Division in Plateau's 1983 Annual Reclamation Retort.

Fourth year growing season results from these plots were collected during July of 1984 and presented to the Division in Plateau's 1984 Annual Reclamation Report. Fifth year results were collected in July and August of 1985. These monitoring results were submitted to the Division in the 1985 Annual Reclamation Report. Based upon plot trends, CPMC requested permission in the 1985 Annual Reclamation Report to discontinue monitoring these plots. The Division approved CPMC's request to discontinue monitoring these plots in June of 1986.

1982 Roadside Mulch Study Plots

In March of 1982, Plateau implemented a mulching study on an extremely unstable road cut along the Lion Deck Portal Access Road. First year seedling density counts were collected on July 7, 1982. This data was submitted to the Division as part of Plateau's 1982 Annual Reclamation Report.

Second year results from the Mulch Study Plots were collected in July 1983 and submitted to the Division in Plateau's 1983 Annual Reclamation Report. Due to the unstable nature of the test site and high degree of soughing that had destroyed many of the plots, Plateau discontinued sampling the Mulch Study Plots after the 1983 monitoring.

1982 Wildlife Mitigation Area

To satisfy BLM, UDWR and Division concerns relative to the Refuse Expansion and Unit Train Loadout areas, Plateau treated a stand of Pinyon-Juniper to enhance wildlife forage production. A detailed discussion of the treatments utilized and first year results are presented in Plateau's 1983 Annual Reclamation Report. Second and third year monitoring results are presented in Plateau's 1984 and 1985 Annual Reclamation Reports. Due to the consistent response of these treatments during the period in which they were monitored, CPMC does not anticipate that these plots will be resampled.

1982 Refuse Test Plots

In the fall of 1982 Plateau initiated an extensive test plots study on a completed portion of the refuse pile to obtain site specific information on the type, depth and fertility requirements of the refuse material. A detailed experimental design is presented in Plateau's 1983 Annual Reclamation Report.

First year monitoring results from these test plots were presented in Plateau's 1983 Annual Reclamation Report. Third year results were submitted in the 1985 Annual Reclamation Report. Fourth year results were submitted to the Division in the 1986 Annual Reclamation Report.

CPMC anticipates monitoring the Refuse Test Plots according to the monitoring frequencies agreed upon during the permitting of the Unit Train Loadout. This monitoring schedule agreed to and summarized in a letter from Plateau dated April 23, 1985 states Plateau would sample the Refuse Test Plots during years 1; 2, 3, 4, 5, 7 and 10, unless the Division and CPMC mutually agreed to modify this sampling schedule. CPMC continues to abide by the schedule with the exception of the straight coal refuse plots which will be sampled only in years 9 and 10 as approved by the Division in a June 3, 1986 letter to CPMC. Plateau discontinued the sampling of slope segments in 1986 based upon approval from the Division that this sampling was not yielding meaningful data. Future sampling of the refuse test will not be done according to slope segments as negotiated with the Division for the 1986 Sampling Program.

342. FISH AND WILDLIFE PLAN.

A detailed discussion of the measures being taken by CPMC to enhance disturbed wildlife habitats and preserve the adjacent undisturbed areas is presented in the response to Section 330. Considerations regarding the existing and postmining land uses of the area are presented in the response to Section 341.

350 thru 352. RECLAMATION PERFORMANCE STANDARDS.

These areas are discussed in considerable detail in the response to Sections 341 and 356 and will should be examined in those sections.

353. REVEGETATION.

353.100 thru 110. VEGETATIVE COVER.

CPMC has long taken an interest in the application of successful reclamation practices. The plant species being proposed for planting have been selected based upon extensive reviews of the literature on range reseeding, wildlife habitat restoration, erosion control and ecological studies on plant succession. These recommendations have been tempted by eleven years of experience gained in nearly continuous revegetation efforts conducted by CPMC to arrive at revegetation seed mixtures which are capable of satisfying all of the regulatory requirements regarding revegetation.

For obvious reasons, primary emphasis was placed on the selection of adapted native species which are capable of rapid establishment, effective soil stabilization and will be permanent. Most of the species being proposed satisfy these criteria. However, a few introduced species have been added where experience dictates they are desirable and necessary to achieve the mandated goals of reclamation.

353.120 thru 250. SPECIES SELECTION CRITERIA.

Plant species for reclamation have been and will be chosen for their nutritional value, cover characteristics and their ability to support and enhance fish and wildlife habitats. Plantings will be grouped and distributed in a manner which optimizes edge effect, cover and other benefits to wildlife.

Regulations allow for the planting of introduced plant species on reclaimed land if approved by the Division. In order for the Division to approve the use of introduced plant species, it must be established that the introduced species are necessary to provide an effective vegetative cover; capable of achieving a diverse, effective, and permanent cover consistent with the postmining land use; the species are necessary to achieve a quick, temporary, and stabilizing cover to control erosion and measures to establish a permanent vegetation are part of the approved plan; the species are compatible with the plant and animal species in the area; and the species meets the State and Federal introduced species statutes.

Only a few introduced species are proposed for final revegetation of the Star Point Mine site. Most of these species were suggested to be seeded in the Saltbush Area. This area is in the Mancos Shale deposits known for their high salt accumulations and heavy soils. Consequently, it can be difficult to achieve adequate plant cover and diversity comprised of desirable species in these areas. The following introduced species have been recommended to be included in the Saltbush Area seed mix

and are known to become established in areas difficult to reclaim: alfalfa (*Medicago sativa*), yellow sweetclover (*Melilotus officinalis*), and crested wheatgrass (*Agropyron cristatum*). Although native to the Intermountain region, squirreltail (*Elymus elymoides*) is known to be an invader of disturbed areas and has also been recommended for the seed mix of this area.

The only introduced plant species in the Sagebrush Area final seed mix are crested wheatgrass and yellow sweetclover. Crested wheatgrass is known to compete with cheatgrass (*Bromus tectorum*), an exotic invader known to be a problem in the sagebrush communities of the Star Point Mine area. Yellow sweetclover can act as a "nurse plant" until other more desirable species become established and outcompete it.

The species mix prescribed by the USDA Forest Service to be used on small disturbances of National Forest land (e.g. fan sites) in the area also had some introduced species including alfalfa, meadow foxtail (*Alopecurus pratensis*), smooth brome (*Bromus inermis*), Orchardgrass (*Dactylis glomeratus*) and Timothy (*Phleum pratensis*).

Finally, for reasons stated in Plateau's January 7, 1987 submittal, a number of introduced species are proposed for reseeding in the Topsoil Stockpile/General Interim Seed Mixture. These species include smooth brome (*Bromus inermis*), western wheatgrass (*Elymus smithii*), crested wheatgrass, intermediate wheatgrass (*Elymus hispidus*), Russian wildrye (*Elymus junceus*), alfalfa and yellow sweetclover. The primary basis for inclusion of the grasses and forbs stem from their ability to be deep rooting species that will promote long term viability of the biological properties of the stockpiled soil material. Although comprehensive rooting depth studies have not been performed on these species in this immediate area, Plateau feels ample evidence is available to document the current proposal. In preparing this review, Plateau concentrated on the two most important rooting characteristics which we believe might affect maintenance of the stockpiled soil materials, the overall depth of rooting and the amount of the root biomass.

353.250 thru 400. APPROVAL OF SEED MIXTURES.

None of the plants being proposed for planting are listed on the Utah Weed Lists. All are widely utilized for reclamation plantings in this area and have long been planted and recommended by numerous federal and state conservation agencies.

354. TIMING OF REVEGETATION.

The normal periods for seeding in the area of the Plateau Permit Area are either spring or fall. The permittee intends to seed in the Fall of the year. Fall plantings can be made any time after September 15 and until snowfall makes it too difficult to operate. In this light, Fall plantings can realistically be made any time during the winter provided there exists a good likelihood of the seed being adequately covered and the ground is not frozen (see also Section 341 and Table 341.100a).

Whenever possible all reclaimed areas will be seeded as contemporaneously as practicable with regrade to operations and the distribution of topsoil. No current plans exist to seed temporary cover crops in any of the reclamation plans at CPMC. Should weather conditions prove prohibitive to the completion of seeding, steps will be taken to control erosion and sediment until seeding can be completed. Sediment and erosion control are discussed in Section 742.200.

Previous experience obtained by CPMC, the BLM, UDWR, USFS and mines operating in this immediate area document that the species included in the proposed seed mixtures are capable of self-regeneration in this ecosystem and are compatible with existing plant successional patterns. No postmining cropland land use areas are being proposed as part of the reclamation at Star Point Mines.

The vegetative cover on all reclaimed areas will be statistically compared to the natural vegetative cover. Each reference area corresponding to each corresponding plant community that was disturbed will be used as a standard to determine revegetation success

As are described in the response to Section 540, it is CPMC's intention to reclaim all disturbed areas except the road surface and embankments approved as a part of the postmining land use to a permanent vegetative cover.

355. MULCHING AND SOIL STABILIZATION.

The primary response to this section was placed in the treatment of the same topic found in Section 341.230. The post disturbance topography is located on Maps 542.200a, b, and c.

356. STANDARDS FOR REVEGETATION SUCCESS.

356.100. REVEGETATION SAMPLING.

The successfulness of future revegetation efforts will be periodically monitored by qualitative and quantitative methods. A schedule for this monitoring is shown on Table 356.100a. Basically, there are two types of reclamation that could be implemented at the CPMC mines. Interim reclamation are areas that are seeded to temporarily protect areas from wind and water erosion. These areas will be redisturbed in the future for one reason or another. The second type of reclamation is final reclamation. This reclamation will be implemented when mining activities are terminated and the area is backfilled, graded and revegetated.

TABLE 356.100a: Revegetation Monitoring Schedule.

		SAMPLE YEAR									
AREA	PARAMETER	1	2	3	4	5	6	7	8	9	10
Reclaimed Areas	Qualitative	X	X	X	X	X	X	X	X	X	X
	Cover				X		X		X	X	X
	Density				X		X		X	X	X
	Diversity				X		X			X	X
	Production					X*				X	X
Reference Areas	Qualitative		X		X	X				X	X
	Cover				X					X	X
	Density				X					X	X
	Diversity				X					X	X
	Production					X*				X	X

* Range condition and production estimated by the NRCS.

Sampling techniques will be similar to those utilized by CPMC since 1982 or as concerns and techniques change other techniques approved by the Division prior to sampling. The results of the monitoring will be submitted to the Division annually. If changes to this monitoring program are deemed necessary, CPMC will initiate such requests in the Annual Reclamation Reports.

It is currently CPMC's intention to utilize established reference areas as the basic means of determining revegetation success with respect to cover, diversity and production. All plant communities will be sampled at the 90 percent confidence interval to a value within 10 percent of the mean.

As has been pointed out previously, between 1916 and 1980 considerable areas were disturbed without topsoil salvage as required by the current regulations. At the present time, CPMC does not expect to have difficulty in reclaiming these areas to the current standards; however, if unforeseen difficulties are encountered, CPMC will readdress the revegetation success criteria for these previously disturbed areas. If such a situation develops, CPMC will notify the Division of the changes if any, that might be necessary.

Governing regulatory agencies (i.e., Forest Service) have been given the opportunity to review and comment on the revegetative methods and standards contained in this permit. Concerns and stipulations have been address by the permittee throughout the term(s) of this permit.

356.200. STANDARDS FOR REVEGETATION SUCCESS.

The Star Point Mine site has a history of mining since 1916. Due to the long history of mining activities that were done by different operators, there has been a variety of surface disturbances affecting the native plant communities in the area. Because different regulations and standards for success apply to different times of disturbance, the disturbance types have been delineated according to implementation of SMCRA (August 3, 1977) and whether or not each area has been used for mining activities since that date. Therefore, the disturbance types have been mapped (Maps 321.100g, 321.100h, 321.100i) and classified in the following 3 categories:

Pre-SMCRA (not used since)
Pre-SMCRA (used continuously since)
Post-SMCRA

As described in 341.220, the mine site has been divided and mapped (Maps 321.100g, 321.100h, 321.100i) showing four areas to be seeded including:

- 1) Saltbush Area,
- 2) Sagebrush Area,
- 3) Mountain Grassland Area,
- 4) Forest Service Areas.

Each area has a revegetation standards chosen to be met at the time of final reclamation. The goal for the reclaimed land is to provide a vegetative cover that is diverse, effective, permanent and achieves approved postmining land use requirements.

State and federal regulations require the success of revegetation for post-SMCRA disturbances be judged on the effectiveness of the vegetation for the approved postmining land use and the extent of the cover be compared to a reference area or other approved success standard. When success standards for the reclaimed areas are used, parameters will be considered equal to the approved standard when they are not less than 90% of the standard. The sampling techniques measuring success will use 90% statistical confidence interval (i.e. one-side test with a 0.10 alpha error).

In areas previously disturbed by mining that were not reclaimed and re-mined or otherwise used by more recent operations (pre-SMCRA, used continuously since), the State regulations require, at a minimum, the vegetative ground cover will not be less than the ground cover that existed before redistribution and will be adequate to control erosion. The operator is not responsible to reclaim areas that were disturbed pre-SMCRA and not redistributed since that time (pre-SMCRA, not used since).

No quantitative data is known for the existing vegetative cover in areas that have been redistributed (pre-SMCRA, used continuously since). Furthermore, many of the pre-SMCRA disturbed areas are adjacent to and between post-SMCRA areas. As an attempt to facilitate the revegetation plan, each major area was given separate and distinct standards for success, all (with the exception of the Forest Service areas) were based on reference areas. Each parameter of the reference areas have been

shown to be equal to or greater than the predisturbance areas. Finally, each of the 4 areas listed above to be seeded and their revegetation success standards are described below. A summary of these standards are given on Table 356.200a.

Table 356.200a: Summary for the standards for revegetation success at the Star Point Mine.

STANDARDS FOR SUCCESS					
SEEDED AREA	DISTURBANCE	COVER	DENSITY	DIVERSITY	PRODUCTION
SALTBUSH	Pre-SMCRA	(no pre-SMCRA)	(no pre-SMCRA)	(no pre-SMCRA)	(no pre-SMCRA)
	Post-SMCRA	Saltbush Reference Area	2,000 plants/ac	Saltbush Reference Area	Saltbush Reference Area
SAGEBRUSH	Pre-SMCRA	Sagebrush Reference Area	2,000 plants/ac	(no standard)	NRCS estimates
	Post-SMCRA	Sagebrush Reference Area	2,000 plants/ac	Sagebrush Reference Area	Sagebrush Reference Area
MOUNTAIN GRASSLAND	Pre-SMCRA	Mtn. Grassland Reference Area	2,000 plants/ac	(no standard)	NRCS estimates
	Post-SMCRA	Mtn. Grassland Reference Area	2,000 plants/ac	Mtn. Grassland Reference Area	Mtn. Grassland Reference Area
FOREST SERVICE	Pre-SMCRA	(no pre-SMCRA)	(no pre-SMCRA)	(no pre-SMCRA)	(no pre-SMCRA)
	Post-SMCRA	(F.S. approval)	(F.S. approval)	(F.S. approval)	(F.S. approval)

Saltbush Area

The Saltbush Area to be seeded was described in 341.220. This area was disturbed for mining activities post-SMCRA. Therefore, pre-SMCRA considerations for standards do not apply for this area. The standards for revegetation success for total living cover and productivity will be statistically compared to those same parameters of the reference area. The woody species density of the reclaimed area will be considered successful when it is at least 90% of the approved standard of 2,000 individuals per acre.

Species diversity will be measured using MacArthur's diversity index. This is an effective diversity measurement and is computed using the equation $1/\sum p_i^2$ (MacArthur and Wilson 1976, *The Theory of Island Biogeography*, Princeton: Princeton University Press). In this equation p_i is the proportion of sum frequency contributed by the i th species in the sample area of concern. The proportional contribution of each species is then squared and the values for all species in the sample areas are summed. This index integrates the number of species and the degree to which frequency of occurrence was equitably distributed among those species. In other words, this index provides greater weight to those species that are present more often (with greater frequency) than those that are merely "present" in one or two quadrats.

Sagebrush Area

The Sagebrush Area has both pre-SMCRA and post-SMCRA disturbance (Map 321.100h). The pre-SMCRA disturbed areas within the Sagebrush Area will be compared to the Sagebrush Reference Area for cover and diversity. The woody species density standard for the pre-SMCRA is 2,000 individuals per acre. Production estimates will be made by the Natural Resources Conservation Service (NRCS) and deemed successful if the range condition is estimated to be at least in "fair" or better condition or will meet the postmining land use and control erosion.

The post-SMCRA total living cover, diversity, and the productivity of reclaimed Sagebrush Area will be statistically compared to the cover and productivity of the reference area. The woody species density of the reclaimed area of the post-SMCRA area will also be considered successful when it is at least 90% of the approved standard of 2,000 individuals per acre.

Mountain Grassland Area

The Mountain Grassland Area also has both pre-SMCRA and post-SMCRA disturbances (Maps 321.100g, 321.100i). The pre-SMCRA disturbed areas will be compared to the Mountain Grassland Reference Area for cover. The woody species density standard for the pre-SMCRA is

2,000 individuals per acre. As other pre-SMCRA areas, annual biomass production estimates will be made by the Natural Resources Conservation Service (NRCS) and deemed successful if the range condition is estimated to be at least in "fair" or better condition or will meet the postmining land use and control erosion.

The post-SMCRA total living cover, diversity, and the productivity of reclaimed Mountain Sagebrush Area will be statistically compared to the cover and productivity of the reference area. The woody species density of the reclaimed area of the post-SMCRA area will also be considered successful when it is at least 90% of the approved standard of 2,000 individuals per acre.

Forest Service Areas

The Forest Service Areas are small, localized disturbances made for fan portals. These disturbances were relatively small (.25 to .44 acres) and located on USDA Forest Service land. Included in these areas were the Corner Canyon Fan, Mudwater Canyon Fan, and Gentry Mountain Fan sites. These areas will be seeded according to a seed mix prepared by the Forest Service. Because the areas are so small, reference areas will not be used for a standard of revegetation success. These areas will be deemed successful for cover, woody species density, diversity and productivity when representatives from the U.S. Forest Service approves them as adequately reclaimed or the ground cover is equal to at least 50 percent of the surrounding undisturbed vegetation cover as specified in the special use permits. The NRCS will also estimate productivity and range condition. Range condition will be "fair" or better and be compatible to meet postmining land use objectives.

The USFS stipulations for the Mudwater Canyon area mandates the woody plant density is at least 350 trees per acre and herbaceous ground cover be equal to at least 50 percent of the surrounding undisturbed vegetation cover.

356.300 thru 400. SILTATION STRUCTURES.

Removal of sediment control structures is discussed in Section 542.

357. LIABILITY PERIOD.

CPMC recognizes that all of the lands within its permit area correspond to the ten year bond liability period and revegetation success data must exceed or equal the reference area standard for at least two consecutive years before bond release will be granted.

357.300. HUSBANDRY PRACTICES

Should CPMC required incorporation of selected alternative husbandry practices, a request will be submitted to UDOGM for their approval.

Weed control when required, will be performed according to the regulation as defined in R645-301-357.320. The control of other pests if required will comply with regulation R645-301-330.

Should temporary control of rodents or other pests be required to ensure successful reclamation, appropriate authorities will be consulted to determine the method of control. No control measures will be used without prior approval by all parties concerned.

R645-301-357.340, 357.350, and 357.360 will be incorporated should they be needed.

358.100. NOTIFICATION OF THREATENED AND ENDANGERED SPECIES.

Coal mining and reclamation operations will be conducted in such a manner as not to jeopardize the continued existence of endangered or threatened species. In addition, CPMC will give notification to the Division of state-or federally list threatened or endangered species within the permit area.

358.500. PROTECTION OF ENVIRONMENTAL VALUES.

CPMC will attempt to utilize the best technology currently available to avoid adverse impacts to the environment and ensure the highest degree of possible reclamation. Specific measures which will be taken to comply with this commitment are detailed in the response to Section 333.

358.510. ELECTRIC PROOFING OF POWER LINES.

Since 1977, power lines constructed by CPMC have been designed to be raptor-proof. In 1981, the UDWR inspected all power poles owned by CPMC for evidence of use and evidence of bird electrocutions. Poles in logical locations of eagle usage showed no evidence of either usage or electrocutions. The UDWR requested the USFWS to inspect CPMC's poles, which they did in August, 1981. The USFWS in a letter to Cleon B. Feight, Director of the Division on October 9, 1981 stated: "The Plateau Mining Company lines were examined for the Star Point Mine. Its lines do not pose a threat to raptors." All power lines built since that time have been properly constructed to preclude the potential of raptor electrocutions.

Photographs of newly constructed power poles for the Unit Train facility constructed in 1984-5 were submitted in CPMC's previous permit application. As can be seen, a triangular "Bird Deflector" has been incorporated into the construction on the side of the cross-arm holding the close wires. This deflector prevents large birds, such as eagles from landing on the cross arms, thus preventing electrocution.

According to the USFWS, the likelihood of eagles using power poles in the mine area is very remote because the birds prefer to perch on dead trees, on the higher canyon sides, and in the sagebrush valleys away from mine activity. This is evidenced by no signs, droppings, prey carcasses, or electrocuted birds below any poles on the CPMC Permit Area.

358.520. OVERLAND CONVEYORS AND MULE DEER MOVEMENT.

In 1981, Division personnel became concerned with the overland conveyor running from the mine to the preparation plant. CPMC committed to maintaining adequate clearance beneath the conveyor for mule deer to cross. Adequate clearance at the time was unknown; therefore the UDWR conducted a study of this conveyor to document deer crossings and to study the effect of various clearances upon deer crossing. This study was published in 1984 (Greenwood and Dalton 1984). Since no new conveyor is being proposed in connection with this permit, the a copy of this study will not be included.

Briefly, deer seemed to prefer areas of 50 to 90 centimeters clearance and one deer actually crossed with only 33 centimeters of clearance. Deer were observed crossing beneath the conveyor during the day, during the night, with the conveyor belt in motion and with the conveyor belt stopped. Some deer showed some anxiety in crossing while others did not.

It has been the experience of personnel at CPMC that mule deer are very adaptable to human presence; even to the extent of becoming curious about mans activity.

The UDWR is now recommending that overland conveyors be constructed with 60-70 percent of the structure elevated a minimum of one meter to allow deer to cross. Conveyors constructed for the Unit Train facilities in 1985 and 1986 have been constructed using this recommendation; the actual

mean height would be greatly higher than one meter since the conveyors are elevated on high towers throughout most of their length.

358.530. EXCLUDING WILDLIFE FROM HAZARDOUS AREAS.

CPMC will continue to ensure that its operations do not pose undue risks to wildlife. No problems have as yet been identified in this area. However, CPMC will continually strive to ensure that no such accidents occur.

Exhibit
321.100a

TABLE 321.100c
Plant Species List by Vegetation Type

SPECIES (SYMBOL)	Mountain Shrub	Sagebrush Grass	Saltbush	Pinyon Juniper	Grassland	Douglas Fir	Aspen	Riparian	Engelmann Spruce	Subalpine Fir
Graminoids										
Agropyron cristatum (AGCR)										
Agrostis exarata (AGEX)										
Agrostis scabra (AGSC2)										
Agrostis stolonifera (AGST)										
Arrhenatherum elatius (AREL)										
Bouteloua gracilis (BOGR)										
Bromus anomalus (BRAN)										
Bromus carinatus (BRCA)										
Bromus ciliatus (BRCI)										
Bromus inermis (BRIN)										
Bromus tectorum (BRTE)										
Calamagrostis spp. (CALAM)										
Calamagrostis canadensis (CACA)										
Calamagrostis rubescens (CARU)										
Carex spp. (CAREX)										
Carex aquatilis (CAAQ2)										
Carex geyeri (CAGE)										
Carex hoodii (CAHO2)										
Carex lanuginosa (CALA2)										
Carex microptera (CAMI)										
Carex rossii (CARO)										
Carex prae-grassilis (CAPR)										
Dactylis glomerata (DAGL)										
Deschampsia caespitosa (DECA)										
Elymus spp. (ELYMU)										
Elymus cinereus (ELCI)										
Elymus elymoides (ELEL)										
Elymus glaucus (ELGL)										
Elymus salinus (ELSA)										
Elymus smithii (ELSM)										
Elymus spicatus (ELSP)										
Elymus trachycaulus (ELTR)										
Festuca idahoensis (FEID)										
Glyceria spp. (GLYCE)										
Glyceria striata (GLST)										
Koeleria macrantha (KOMA)										
Leucopoa kingii (LEKI)										
Melica spp. (MELIC)										
Melica bulbosa (MEBU)										

SPECIES (SYMBOL)	Mountain Shrub	Sagebrush Grass	Saltbush	Pinyon Juniper	Grassland	Douglas Fir	Aspen	Riparian	Engelmann Spruce	Subalpine Fir
<i>Phleum alpinum</i> (PHAL)										
<i>Poa</i> spp. (POA)										
<i>Poa fendleriana</i> (POFE)										
<i>Poa nervosa</i> (PONE2)										
<i>Poa palustris</i> (POPA)										
<i>Poa pratensis</i> (POPR)										
<i>Poa secunda</i> (POSE)										
<i>Stipa comata</i> (STCO)										
<i>Stipa hymenoides</i> (STHY)										
<i>Stipa lettermani</i> (STLE)										
<i>Stipa nelsonii</i> (STNE)										
Forbs										
<i>Achillea millefolium</i> ssp. <i>lanulosa</i> (ACMIL)										
<i>Aconitum columbianum</i> (ACCO)										
<i>Actaea rubra</i> (ACRU)										
<i>Agastache urticifolia</i> (AGUR)										
<i>Agoseris glauca</i> (AGGL)										
<i>Allium</i> spp. (ALLIU)										
<i>Allium acuminatum</i> (ALAC)										
<i>Androsace septentrionalis</i> (ANSE)										
<i>Antennaria parviflora</i> (ANPA3)										
<i>Aquilegia coerulea</i> (AQCO)										
<i>Arabis</i> spp. (ARABI)										
<i>Arabis drummondii</i> (ARDR2)										
<i>Arenaria</i> spp. (ARENA)										
<i>Arenaria congesta</i> (ARCO2)										
<i>Arnica cordifolia</i> (ARCO)										
<i>Artemisia ludoviciana</i> (ARLU)										
<i>Asclepias</i> spp. (ASCP)										
<i>Aster</i> spp. (ASTER)										
<i>Aster chilensis</i> (ASCH)										
<i>Aster engelmannii</i> (ASEN)										
<i>Aster foliaceus</i> (ASFO)										
<i>Aster glaucodes</i> (ASGL)										
<i>Aster occidentalis</i> (ASCO)										
<i>Astragalus</i> spp. (ASTRA)										
<i>Astragalus argophyllus</i> (ASAR2)										
<i>Astragalus argophyllus</i> var. <i>martinii</i> (ASARM2)										
<i>Astragalus coltonii</i> (ASCO4)										
<i>Astragalus convallarius</i> (ASCO)										
<i>Astragalus miser</i> (ASMI2)										
<i>Astragalus musiniensis</i>										
<i>Astragalus tenellus</i> (ASTE3)										

SPECIES (SYMBOL)	Mountain Shrub	Sagebrush Grass	Saltbush	Pinyon Juniper	Grassland	Douglas Fir	Aspen	Riparian	Engelmann Spruce	Subalpine Fir
<i>Calochortus nuttallii</i> (CANUN)										
<i>Castilleja chromosa</i> (CACH3)										
<i>Castilleja linariifolia</i> (CALI)										
<i>Calamagrostis stricta</i> (CAST)										
<i>Chenopodium album</i> (CHAL)										
<i>Chenopodium fremontii</i> (CHFR2)										
<i>Cirsium</i> spp. (CIRSI)										
<i>Cirsium neomexicanum</i> var. <i>utahense</i>										
<i>Cirsium scariosum</i> (CISA)										
<i>Collinsia</i> spp. (COLLI)										
<i>Collinsia parviflora</i> (COPA2)										
<i>Collomia linearis</i> (COLI)										
<i>Comandra</i> spp. (COMAN)										
<i>Comandra umbellata</i> (COUM)										
<i>Crepis acuminata</i> (CRAC)										
<i>Crepis intermedia</i> (CRIN)										
<i>Crepis occidentalis</i> (CROC)										
<i>Crepis runcinata</i> (CRRU)										
<i>Cryptantha flava</i> (CRFL)										
<i>Cryptantha fulvocanescens</i> (CRFU)										
<i>Cryptantha mensana</i> (CRME)										
<i>Cymopterus bulbosus</i> (CRBU)										
<i>Cymopterus lemmonii</i> (CYLE)										
<i>Cymopterus longipes</i> (CYLO)										
<i>Cymopterus newberryi</i> (CYNE)										
<i>Cymopterus purpurascens</i> (CYPU)										
<i>Delphinium nuttallianum</i> (DENU)										
<i>Delphinium occidentale</i> (DEOC)										
<i>Delphinium occidentale</i> var. <i>barbeyi</i> (DECOB)										
<i>Descurainia californica</i> (DECA2)										
<i>Epilobium angustifolium</i> (EPAN)										
<i>Equisetum arvense</i> (EQAR)										
<i>Erigeron</i> spp. (ERIGE)										
<i>Erigeron eatonii</i> (EREA)										
<i>Erigeron peregrinus</i> (ERPE)										
<i>Erigeron speciosus</i> (ERSP)										
<i>Erigeron ursinus</i> (ERUR)										
<i>Eriogonum</i> spp. (ERIOG)										
<i>Eriogonum alatum</i> (ERAL)										
<i>Eriogonum corymbosum</i> (ERCO7)										
<i>Eriogonum jamesii</i> (ERJA)										
<i>Eriogonum racemosum</i> (ERRA)										
<i>Eriogonum umbellatum</i> (ERUN)										

SPECIES (SYMBOL)	Mountain Shrub	Sagebrush Grass	Saltbush	Pinyon Juniper	Grassland	Douglas Fir	Aspen	Riparian	Engelmann Spruce	Subalpine Fir
Fragaria spp. (FRAGA)										
Fragaria vesca (FRVE)										
Fragaria virginiana (FRVI)										
Galium spp. (GALJU)										
Galium bifolium (GABI)										
Galium boreale (GABO)										
Geranium spp. (GERAN)										
Geranium richardsonii (GERI)										
Geranium viscosissimum (GEVI)										
Gilia aggregata (GIAG)										
Grindelia squarrosa (GRSQ)										
Hackelia spp. (HACKE)										
Hackelia floribunda (HAFL)										
Hedysarum boreale (HEBO)										
Hedysarum occidentale variation canone (HEOCA)										
Helenium hoopesii (HEHO)										
Helianthella uniflora (HEUN)										
Heracleum lanatum (HELA)										
Heuchera parviflora (HEPA)										
Hieracium albiflorum (HIAL)										
Hydrophyllum occidentale (HYOC)										
Hymenoxys acaulis (HYAC)										
Hymenoxys richardsonii (HYRI)										
Lappula occidentalis										
Lathyrus spp. (LATHY)										
Lathyrus arizonicus var. leucanthus (LAARL)										
Lathyrus lanzwertii (LALA)										
Lathyrus pauciflorus (LAPA)										
Ligusticum filicinum (LIFI)										
Ligusticum porteri (LIPO)										
Linum perenne ssp. lewisii (LIPEL)										
Linnaea borealis (LIBO)										
Lithospermum ruderae (LIRU)										
Lomatium dissectum (LODI)										
Lupinus spp. (LUPIN)										
Lupinus argenteus (LUAR)										
Lupinus caudatus (LUCA)										
Lupinus sericeus (LUSE)										
Machaeranthera canescens (MACA)										
M. grindelioides (MAGR)										
Mentha spp. (MENTH)										
Mertensia spp. (MERTE)										
Mertensia arizonica (MEAR)										

SPECIES (SYMBOL)	Mountain Shrub	Sagebrush Grass	Saltbush	Pinyon Juniper	Grassland	Douglas Fir	Aspen	Riparian	Engelmann Spruce	Subalpine Fir
Mertensia ciliata (MECI)										
Mertensia franciscana (MEFR2)										
Mitella stauropetala										
var. stenopetala (MIST2)										
Nemophila breviflora (NEBR)										
Oenothera caespitosa (OECA)										
Osmorhiza chilensis (OSCH)										
Osmorhiza occidentalis (OSOC)										
Pedicularis centranthera (PECE)										
Pedicularis racemosa (PERA3)										
Penstemon carnosus (PECA2)										
Penstemon subglaber (PESU)										
Penstemon watsonii (PEWA2)										
Phlox hoodii (PHHO)										
Phlox longifolia (PHLO)										
Polemonium foliosissimum (POFO)										
Polemonium pulcherrimum (POPU)										
Polygonum douglasii (PODO)										
Polygonum spp. (POLY3)										
Polygonum bistortoides (POBI)										
Polygonum johnstonii var. squatchense										
Potentilla concinna (POTGR)										
Potentilla fruticosa (POFR)										
Potentilla gracilis (POGR4)										
Pyrola secunda (PYSE)										
Rudbeckia occidentalis (RUOC)										
Salsola iberica (SAIB)										
Schoenocrambe linifolia										
Sedum lanceolatum (SELA)										
Senecio spp. (SENEC)										
Senecio multilobatus (SEMU2)										
Senecio triangularis (SETR)										
Silene menziesii (SIME)										
Smilacina spp. (SMILA)										
Smilacina stellata (SMST)										
Solidago parryi (SOPA)										
Sphaeralcea coccinea (SPCO2)										
Stanleya pinnata (STPI2)										
Stellaria jamesiana (STJA)										
Streptopus amplexifolius (STAM)										
Taraxacum officinale (TAOF)										
Thalictrum fenderli (THFE)										
Thermopsis montana (THMO)										

SPECIES (SYMBOL)	Mountain Shrub	Sagebrush Grass	Saltbush	Pinyon Juniper	Grassland	Douglas Fir	Aspen	Riparian	Engelmann Spruce	Subalpine Fir
Trifolium longipes (TRLO)										
Urtica dioica (URDI)										
Valeriana edulis (VAED)										
Vicia spp. (VICIA)										
Vicia americana (VIAM)										
Viguiera multiflora (VIMU)										
Viola adunca (VIAD)										
Viola spp. (VIOLA)										
Viola nuttallii (VINU)										
Zigadenus paniculatus (ZIPA)										
Shrubs and Trees										
Abies concolor (ABCO)										
Abies lasiocarpa (ABLA)										
Acer glabrum (ACGL2)										
Acer grandidentatum (ACGR)										
Alnus incana										
Amelanchier alnifolia (AMAL)										
Amelanchier utahensis (AMUT)										
Artemisia frigida (ARFR)										
Artemisia nova (ARNO)										
Artemisia tridentata (ARTR)										
Artemisia tridentata spp. vaseyana (ARTRV)										
Artemisia tridentata wyomingensis (ARTRW)										
Atriplex confertifolia (ATCO)										
Atriplex gardneri var. cuneata (ATGAC)										
Betula occidentalis (BEOC)										
Ceratoides lanata (CELA)										
Cercocarpus ledifolius (CELE)										
Cercocarpus montanus (CEMO)										
Chrysothamnus nauseosus (CHNA)										
Chrysothamnus viscidiflorus (CHVI)										
Clematis ligusticifolia (CLLI)										
Ephedra viridis (EPVI)										
Gutierrezia sarothrae (GUSA)										
Juniperus communis (JUCO)										
Juniperus osterosperma (JUOS)										
Juniperus scopulorum (JUSC)										
Lonicera involucrata (LOIN)										
Lonicera utahensis (LOUT)										
Mahonia repens (MARE)										
Opuntia spp. (OPUNT)										
Opuntia fragilis (OPFRF)										

SPECIES (SYMBOL)	Mountain Shrub	Sagebrush Grass	Saltbush	Pinyon Juniper	Grassland	Douglas Fir	Aspen	Riparian	Engelmann Spruce	Subalpine Fir
<i>Opuntia polycantha</i> (OPPO)										
<i>Pachistima myrsinites</i> (PAMY)										
<i>Pediocactus simpsonii</i>										
<i>Physocarpus monogynus</i> (PHMO)										
<i>Picea engelmannii</i> (PIEN)										
<i>Picea pungens</i> (PIPU)										
<i>Pinus edulis</i> (PIED)										
<i>Pinus flexilis</i> (PIFL)										
<i>Pinus ponderosa</i> (PIPO)										
<i>Populus angustifolia</i> (POAN)										
<i>Populus tremuloides</i> (POTR)										
<i>Prunus virginiana</i> (PRVI)										
<i>Pseudotsuga menziesii</i> (PSME)										
<i>Purshia tridentata</i> (PUTR)										
<i>Quercus gambelii</i> (QUGA)										
<i>Ribes</i> spp. (RIBES)										
<i>Ribes cereum</i> (RICE)										
<i>Ribes inerme</i> (RIIN)										
<i>Ribes montigenum</i> (RIMO)										
<i>Ribes viscosissimum</i> (RIVI)										
<i>Rosa</i> spp. (ROSA)										
<i>Rosa woodsii</i> (ROWO)										
<i>Salix bebbiana</i> (SABE)										
<i>Salix boothii</i> (SABO)										
<i>Salix drummondiana</i> (SADR)										
<i>Salix exigua</i> (SAEX)										
<i>Salix geyeriana</i> (SAGE)										
<i>Salix lasiandra</i> (SALA)										
<i>Salix scouleriana</i> (SASC)										
<i>Sambucus</i> spp. (SAMBU)										
<i>Sambucus caerulea</i> (SACE)										
<i>Sambucus racemosa</i> (SARP)										
<i>Sarcobatus vermiculatus</i> (SAVE)										
<i>Shepherdia canadensis</i> (SHCA)										
<i>Sorbus scopulina</i> (SOSC)										
<i>Symphoricarpos oreophilus</i> (SYOR)										
<i>Tamarix ramosissima</i> (TARA)										
<i>Tetradymia glabrata</i> (TEGL)										
<i>Vaccinium caespitosum</i> (VACA)										
<i>Yucca harrimaniae</i> (YUHA)										

NOTE:

This table contains species lists for all plant communities that have been quantitatively sampled by Plateau or are reported from site specific Forest Service studies as being present in the plant communities found in the CPMC Permit Area.

TABLE 321.100d
1981 Sample Adequacy Calculations

Site	Parameter	Mean	SD	# Samples Taken	# Samples Required	
					Nm 90/10	Nm 80/10
Mountain Grassland Reference Area						
	% Cover	43.6	16	40	36.44	22.13
Sagebrush Community Predisturbance Area						
	% Cover	42.1	28.7	54	125.76	76.38
	% Canopy Cover	55	12	50	12.88	7.82
	# Stems Per 10 ft2	4.5	2.4	50	76.97	46.75
Sagebrush Reference Area						
	% Cover	33.7	30.5	50	221.65	134.62
	% Canopy Cover	35.6	19	50	77.08	46.82
	# Stems Per 10 ft2	4	2.2	50	81.86	49.72

TABLE 321.100e
Total Plant Cover and Species Composition
for the Mountain Grassland Reference Area

SPECIES	PERCENT COVER	COMPOSITION
Graminoids		
<i>Elymus salinus</i>	25.3	58.08
<i>Leucopoa kingii</i>	1.6	3.67
SUBTOTAL	26.9	61.7
Forbs		
<i>Astragalus coltonii</i>	5.4	12.4
<i>Achillea millefolium</i>	2	4.59
<i>Hymenoxys richardsonii</i>	1.4	3.21
<i>Linum perenne</i> spp. <i>lewisii</i>	0.7	1.61
<i>Erigeron umbellatum</i>	0.6	1.38
<i>Penstemon watsonii</i>	0.4	0.92
<i>Phlox longifolia</i>	0.3	0.69
<i>Erigeron</i> spp.	0.2	0.5
<i>Machaeranthera grindelioides</i>	0.2	0.5
<i>Poa</i> spp.	0.2	0.5
<i>Potentilla richardsonii</i>	0.2	0.5
<i>Heuchera parvifolia</i>	0.2	0.5
<i>Koeleria macrantha</i>	0.1	0.23
<i>Poa secunda</i>	0.1	0.23
<i>Arabis drummondii</i>	0.1	0.23
SUBTOTAL	12.1	27.75
Shrubs and Trees		
<i>Pseudotsuga menziesii</i>	1.8	4.13
<i>Chrysothamnus viscidiflorus</i>	1.7	3.9
<i>Ceratoides lanata</i> <i>Rosa woodsii</i>	0.4	0.92
<i>Rosa woodsii</i>	0.4	0.92
<i>Symphoricarpos oreophilus</i>	0.2	0.5
SUBTOTAL	4.5	10.32
TOTAL PLANT COVER	43.6	100.11
TOTAL LITTER	42.3	-
TOTAL BARE GROUND	14.1	-

TABLE 321.100f
Statistical Comparison of Pre-Disturbance and Reference
Areas Sampled in 1981

Parameter	Predisturbance Mean	Reference Mean	t-value
Sagebrush Community			
% Cover	42.2	26.4	2.1073**
% Canopy Cover	55	36	4.4591***
# Stems Per 10 ft ²	4.2	4.6	0.7303*

- * t-value indicates sample means are not significantly different at the 0.1 probability level.
- ** t-value indicates sample means are significantly different at the 0.5 probability level.
- *** t-value indicates sample means are significantly different at all probability levels.

TABLE 321.100g
Total Plant Cover and Species Composition Comparisons
for the Predisturbance and Reference Sagebrush Areas

Species	Pre-Disturbance		Reference	
	Cover	Comp.	Cover	Comp.
Grasses				
<i>Elymus elymoides</i>	4.9	11.57	4.2	12.47
<i>Bromus tectorum</i>	0	0	0.9	2.67
<i>Stipa comata</i>	0	0	0.5	1.48
<i>Agropyron cristatum</i>	0	0	0.4	1.19
<i>Elymus salinus</i>	2	4.72	0.2	0.6
<i>Poa secunda</i>	1.4	3.31	0.1	0.3
<i>Stipa hymenoides</i>	1	2.36	0.1	0.3
SUBTOTAL	9.3	22.09	6.4	18.99
Forbs				
<i>Sphaeralcea coccinea</i>	0.3	0.71	0.3	0.89
<i>Machaeranthera canescens</i>	0.1	0.23	0.1	0.3
<i>Erigeron eatonii</i>	0	0	0.1	0.3
<i>Arabis</i> spp.	0.2	0.47	0	0
<i>Calochortus nuttallii</i>	0	0	0	0
<i>Eriogonum</i> spp.	0.1	0.23	0	0
<i>Penstemon carnosus</i>	0.1	0.23	0	0
SUBTOTAL	0.8	1.9	0.5	1.48
Shrubs				
<i>Artemisia tridentata</i>	30.8	72.92	26.7	79.3
<i>Chrysothamnus viscidiflorus</i>	1.4	3.31	0.1	0.3
SUBTOTAL	32.2	76.48	26.8	79.53
Total Plant Cover	42.1	100.06	33.7	100.1
Litter	25.2	-	26.1	-
Total Ground Cover	67.3	-	59.8	-
Bare Ground	32.7	-	40.2	-
N =	54	-	50	-
X =	42.1	-	33.7	-
SD =	28.7	-	30.5	-
Nm 90/10 =	125.76	-	221.65	-
Nm 80/10 =	76.38	-	134.62	-

TABLE 321.100h
Line Intercept Canopy Cover Comparisons of the Predisturbance
and Reference Areas for the Sagebrush Community

Species	Predisturbance Cover	Reference Cover
<i>Artemisia tridentata</i>	55	35.6
N =	50	50
X =	55.0%	35.8%
SD =	12	19
Nm 90/10 =	12.88	76.22
Nm 80/10 =	7.82	46.29

TABLE 321.100i
Woody Plant Density Characteristics of the
Sagebrush Plant Community

Species	Stem Size Classes			
	0-1"	1-2"	2"+	Total
PREDISTURBANCE AREA				
Transect Totals				
Artemisia tridentata	84	64	79	227
Average Height (dm)				
Artemisia tridentata	5.5	7.4	8.9	
# Stems Per Acre				
Artemisia tridentata	7318	5576	6882	19,776*
*This value represents the total number of stems per acre, not the actual number of shrubs. Based upon the 153 individual plants encountered during the sampling the estimated shrub density is 13,329 shrubs per acre.				
N = 50; Mean = 4.5 stems per 10 ft ² ; SD = 2.4; Nm 90/10 = 76.97; Nm 80/10 = 46.75				
REFERENCE AREA				
Transect Totals				
Artemisia tridentata	35	84	78	197
Chrysothamnus nauseosus	2	0	0	2
TOTAL	37	84	78	199
Average Height (dm)				
Artemisia tridentata	4.2	4.6	6.4	5.1
Chrysothamnus nauseosus	5	0	0	5
# Stems Per Acre				
Artemisia tridentata	3049	7318	6795	17162
Chrysothamnus nauseosus	174	0	0	174
TOTAL	3233	7318	6795	17336

N = 50; Mean = 4.0 stems per 10 ft²; SD = 2.2; Nm 90/10 = 81.86; Nm 80/10 = 49.72

TABLE 321.100j
Saltbush Vegetation Type Predisturbance Plant Cover

	TRANSECT (%)																TOTAL	MEAN	COMP.
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16			
Grasses																			
ELTR	7	3	1	12	11	1	3	5	0	0	0	0	13	4	4	5	69	4.31	26.44
ELSA	0	0	0	0	0	0	0	0	4	9	4	9	0	0	0	0	26	1.63	9.96
STHY	0	0	0	0	0	0	0	0	8	0	0	0	0	0	0	0	8	0.5	3.06
SUBTOTAL	7	3	1	12	11	1	3	5	12	9	4	9	13	4	4	5	103	6.44	39.46
Forbs																			
ERIOG	2	0	2	0	4	5	0	1	1	0	0	0	0	6	0	0	21	1.31	8.05
AFORB	0	0	1	1	0	0	0	0	0	1	0	1	0	0	0	0	3	0.19	1.15
SENEC	0	0	0	0	0	0	0	0	1	2	0	0	0	0	0	0	3	0.19	1.15
ASTER	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	2	0.13	0.77
SUBTOTAL	2	0	3	1	4	5	0	1	2	4	1	0	0	6	0	0	29	1.81	11.12
Shrubs																			
ATCO	0	7	12	6	4	5	19	13	5	0	4	5	0	8	5	13	106	6.63	40.61
CHVI	0	0	8	0	0	0	0	0	0	0	0	0	0	2	3	0	13	0.81	4.98
PIED	0	0	0	0	0	7	0	0	0	0	0	0	0	0	0	0	7	0.44	2.68
ARTRW	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	2	0.13	0.77
AMUT	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	1	0.06	0.38
SUBTOTAL	0	7	20	6	4	12	19	13	6	0	4	7	0	10	8	13	129	8.06	49.42
TOTAL	9	10	24	19	19	18	22	19	20	13	9	16	13	20	12	18	261	16.31	100

N = 16; Mean = 16.31; SD = 4.72; Nm 90/10 = 22.66; Nm 80/10 = 13.76

TABLE 321.100k
Saltbush Vegetation Type Reference Area Plant Cover

	Transect (%)															TOTAL	MEAN	COMP.
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15			
Grasses																		
ELTR	7	3	17	4	9	10	12	7	3	6	8	2	0	6	15	109	7.27	41.45
ELSA	0	0	0	0	0	0	0	0	6	0	0	4	2	0	0	12	0.8	4.56
STHY	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	1	0.07	0.38
SUBTOTAL	7	3	17	4	9	10	12	8	9	6	8	6	2	6	15	122	8.14	46.39
Forbs																		
AFORB	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	1	0.07	0.38
BRASS	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	0.07	0.38
STPI	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0.07	0.38
SUBTOTAL	0	0	0	0	0	0	0	0	0	0	1	0	0	1	1	3	0.21	1.14
Shrubs																		
ATCO	5	8	7	15	2	3	3	12	5	7	6	14	14	7	8	116	7.73	44.11
ARTRW	0	0	0	0	0	10	0	0	0	0	0	0	0	0	0	10	0.67	3.8
ERIOG	3	0	1	0	0	0	0	0	5	1	0	0	0	0	0	10	0.67	3.8
CHVI	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	1	0.07	0.38
EPVI	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	0.07	0.38
SUBTOTAL	8	8	8	15	2	13	3	13	10	8	6	15	14	7	8	138	9.21	52.47
TOTAL	15	11	25	19	11	23	15	21	19	14	15	15	14	7	8	263	17.56	100

N = 15; Mean = 17.53; SD = 4.53; Nm 90/10 = 18.07; Nm 80/10 = 10.98

N = 15; Mean = 17.53; SD = 4.53; Nm 90/10 = 18.07; Nm 80/10 = 10.98

TABLE 321.1001
Saltbush Vegetation Type Predisturbance Woody Plant Density

	Transect (# plants /m2)																												TOTAL	AVERAGE	COMP.	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28				
	Species																															
ATCO	0.2	0.2	0	0.1	0.1	0	0	0	0.2	0	0	0	0	0	0	0	1	0	1	1	0	0	0	0	0	0	0	0	0	6.36	0.227	38.69
ARLO	0	0	0	0.1	0.1	0	0	0	0.3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3.38	0.121	20.56
ATGAC	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2.92	0.104	17.76	
ERIOG	0.2	0.1	0	0.1	0.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1.26	0.045	7.66	
CHVI	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.78	0.029	4.74	
CEMO	0	0	0	0.1	0.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.72	0.026	4.38	
TARA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.4	0.014	2.34	
AMUT	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.26	0.009	1.58	
EPVI	0.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.16	0.006	0.97	
PIED	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0.004	0.61	
JUOS	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.08	0.003	0.49	
CHNA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.02	0.001	0.12	

N = 28; X = .588; SD = .215; Nm 90/10 = 36.18; Nm 80/10 = 21.97

N = 28; X = .588; SD = .215; Nm 90/10 = 36.18; Nm 80/10 = 21.97

TABLE 321.100m
Saltbush Vegetation Type Reference Area Woody Plant Density

	Transect (# plants/m2)																				TOTAL	MEAN	COMP.	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20				
Species																								
ATCO	0.37	0.4	0.1	0.5	0.7	0.6	0	0.8	0.6	0.4	0	0	1	0	0	0.1	0.2	0.2	0.2	0.1	7.82	0.391	64.16	
ARLO	0	0	0	0	0	0.2	0	0	0	0	0	0	0	0	0	0.1	0.1	0.1	0.1	0.2	1.31	0.066	10.75	
ERIOG	0.07	0	0	0	0	0	0	0	0.2	0.3	0	0	0	0	0	0	0	0	0	0	1.3	0.065	10.66	
ATGAC	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	0.3	0.3	0.2	0.2	1.18	0.059	9.68	
CHVI	0.01	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.27	0.014	2.21	
EPVI	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.14	0.007	1.15		
CHNA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.12	0.006	0.98		
PIED	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.03	0.002	0.25		
JUOS	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.02	0.001	0.16		
TOTAL	0.45	0.5	0.2	0.6	0.8	0.8	1	1	0.7	0.7	1	0	1	1	0	0.5	0.6	0.7	0.5	0.6	12.19	0.611	100	

N = 20; Mean = .611; SD = .182; Nm 90/10 = 24.01; Nm 80/10 = 14.58

N = 20; Mean = .611; SD = .182; Nm 90/10 = 24.01; Nm 80/10 = 14.58

TABLE 321.100n
Corner Canyon Aspen Pre-Disturbance Plant Cover

	Transect (%)												TOTAL	AVERAGE	COMP.
	1	2	3	4	5	6	7	8	9	10	11	12			
Grasses															
BRCA	20	17	19	10	3	11	2	1	1	0	0	2	86	7.17	8.19
ELCI	0	0	0	0	0	0	9	8	4	5	10	13	49	4.08	4.66
POA	6	4	5	3	0	7	4	3	5	6	0	0	43	3.58	4.09
MEBU	2	2	2	0	0	0	0	2	1	5	3	0	17	1.42	1.62
ELTR	0	0	0	0	0	0	3	2	0	0	0	0	5	0.42	0.48
CALAM	4	0	0	0	0	0	0	0	0	0	1	0	5	0.42	0.48
DAGL	0	0	0	0	0	0	0	0	0	0	0	1	1	0.08	0.1
AGROST	0	0	0	1	0	0	0	0	0	0	0	0	1	0.08	0.1
SUBTOTAL	32	23	26	14	3	18	18	16	11	16	14	16	207	17.25	19.7
Forbs															
LATHY	32	31	49	39	32	34	25	43	42	41	24	35	427	35.58	40.63
MERTE	16	34	14	8	3	28	35	15	23	18	42	17	253	21.03	24.01
ASTER	0	0	0	0	0	0	6	2	4	9	0	0	21	1.75	2
THFE	1	1	1	5	7	0	1	0	0	2	0	2	20	1.67	1.91
ACMIL	1	2	2	2	4	1	0	2	3	0	1	0	18	1.5	1.71
MUSTARD	2	0	0	0	0	0	0	0	0	0	6	2	10	0.83	0.95
VIOLA	1	0	0	0	2	1	0	0	0	0	1	4	9	0.75	0.86
OSOC	1	0	4	0	0	0	0	0	0	1	0	1	7	0.58	0.66
FEOV	0	0	0	0	3	0	0	0	0	0	0	3	6	0.5	0.57
PFORB	0	0	1	0	0	0	1	0	0	1	0	2	5	0.42	0.48
SMILA	0	0	0	0	0	0	1	2	1	0	0	0	4	0.33	0.38
VIAM	0	0	0	0	0	4	0	0	0	0	0	0	4	0.33	0.38
LUPIN	0	0	0	1	2	0	0	0	0	0	0	0	3	0.25	0.3
COLLO	2	0	0	0	0	0	0	0	0	0	0	0	2	0.17	0.19
GALIUM	0	0	0	0	0	0	0	0	0	0	0	2	2	0.17	0.19
GERAN	0	0	0	1	1	0	0	0	0	0	0	0	2	0.17	0.19
TAOF	0	0	0	1	0	0	0	0	1	0	0	0	2	0.17	0.19
SUBTOTAL	56	68	71	57	54	68	69	64	74	72	74	68	795	66.25	75.65

	Transect (%)												TOTAL	AVERAGE	COMP.
	1	2	3	4	5	6	7	8	9	10	11	12			
Shrubs and Trees															
SYOR	0	0	3	8	4	5	0	0	0	4	6	2	32	2.67	3.05
ABLA	1	0	0	0	9	0	0	0	0	0	0	0	10	0.83	0.95
RICE	0	0	0	2	0	0	0	0	3	0	0	0	5	0.42	0.48
ROWO	0	0	0	0	0	0	0	0	0	2	0	0	2	0.17	0.19
SUBTOTAL	1	0	3	10	13	5	0	0	3	6	6	2	49	4.08	4.66
TOTAL	89	91	100	81	70	91	87	80	88	94	94	86	1051	87.58	100.01
N = 12; Mean = 87.58; SD = 7.83; Nm 90/10 = 2.16; Nm 80/10 = 1.31															

TABLE 321.100o
Corner Canyon Aspen Pre-Disturbance Area Woody Plant Density

	Transect												TOTAL	AVERAGE	COMP.
	1	2	3	4	5	6	7	8	9	10	11	12			
	Shrubs (#/100m2)														
SYOR	11	13	8	10	8	16	9	8	6	7	5	30	131	10.92	48.52
RICE	1	0	3	10	12	1	0	6	9	2	4	3	51	4.25	18.89
POTR	7	4	5	0	0	0	14	0	4	10	0	0	44	3.67	16.3
ROWO	2	1	0	5	0	0	1	6	6	3	6	0	30	2.5	11.11
ABLA	3	0	0	0	0	0	0	0	0	0	5	0	8	0.67	2.96
ACGR	0	0	0	0	0	0	0	0	0	0	2	1	3	0.25	1.11
SAMB	0	0	3	0	0	0	0	0	0	0	0	0	3	0.25	1.11
TOTAL	24	18	19	25	20	17	24	20	25	22	22	34	270	22.5	100
N = 12; Mean = 22.50; SD = 4.52; Nm 90/10 = 10.92; Nm 80/10 = 6.63															
Trees (#/200m2)															
POTR	22	24	22	22	18	25	24	24	21	23	19	0	244	22.18	97.97
SAMB	3	0	2	0	0	0	0	0	0	0	0	0	5	0.45	1.99
TOTAL	25	24	24	22	18	25	24	24	21	23	19	0	249	22.64	99.96
N = 12; Mean = 22.64; SD = 2.38; Nm 90/10 = 2.99; Nm 80/10 = 1.82															

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R645-301-400. LAND USE AND AIR QUALITY

410. LAND USE.

Following are descriptions of premining land use and proposed postmining land use.

411. ENVIRONMENTAL DESCRIPTION.

411.100. thru 411.110. PREMINING LAND-USE INFORMATION.

Historically, the livestock industry has been an integral part of the region's economy. Early settlers depended on range land for grazing sheep, cattle, and horses. As time passed, grazing operations became smaller, more numerous, and directly associated with small farms. Timber also has been an integral part of the economy of the region, but on a much smaller scale than the livestock industry. Early settlers needed fence posts, corral poles, house logs, mine timber, railroad ties, and lumber. Numerous small sawmills supplied local needs. As time passed and needs diminished, most mills went out of business. No timber has been commercially harvested in the past 20 years.

Non-commercial use of the land has been as wildlife habitat. The area supports a good population of game wildlife and is therefore used for hunting.

411.120. LAND-USE DESCRIPTION IN CONJUNCTION WITH OTHER ENVIRONMENTAL RESOURCES INFORMATION.

Land capability and productivity before mining have been only slightly reduced compared to the present land capability. Mining activities have proceeded on the current lease areas of the CPMC for several decades with only minor effects on productive capabilities in terms of soils, topography, vegetation, wildlife, or hydrology. The soils indigenous to the area affected by the operations are described in R645-301-200. Vegetation and wildlife are discussed in R645-301-300. Land productivity in terms of plant products before any mining did not differ greatly from present productivity. Wildlife, sheep, cattle, and horses used the land for grazing. Small scale timbering has in the past provided fence posts, corral poles, house logs, and railroad ties. Farming in the area is prohibited by the steep and rocky terrain and the lack of water.

The land use of the Unit Train Loadout area is that of grazing by domestic livestock and wildlife. Grazing, which is by cattle, is under the control of the BLM and is part of the Wattis Grazing Allotment. The allotment contains approximately 3,500 acres of Public Land with an allocation of about 100 AUM's. This amounts to 35 acres per AUM which reflects the low productivity of the area. Due to steepness of slope and the inherent lack of production on the Badlands, the actual contribution of this area to the grazing resource is very low. According to BLM, some fence posts and cord wood are cut from Badlands but, in general, the land is not managed intensively for these products. Likewise, the local SCS office describes the Badlands as not containing a developed soil, but consists

of geologic material derived from weathered Mancos Shale and sandstone which do not have an agronomic potential for the production of food or fiber. Current and future land use will suit the physical features of the mine plan area, which are mostly steep and rocky. Such land is well suited for management as a multi-use area, and coal mining fits appropriately into the overall land use scheme. Land productivity data were obtained from USFS and BLM.

Besides coal, oil and gas are the known minerals of value in the environs of the permit area. A few wells drilled in a field adjacent to the permit area produced gas and oil from 1924 to 1976. This field is now abandoned and there are no producing wells within the permit boundary. The one exploration hole drilled on the CPMC Permit Area proved to be dry. No minerals other than coal have been extracted from the permit area.

411.130. Existing Land Uses and Land-Use Classifications.

Recreational use of the general region of the permit area consists of hunting, camping, picnicking, mountain biking, horseback riding, ATV riding, and hiking. Snowmobiling also occurs where the slopes are not too steep.

The CPMC property and adjacent area are currently used for grazing, recreation, forestry, and coal mining. The majority of the surface under which CPMC has federal leases is managed by the USFS under the multiple use and sustained yield concepts. Lands under state leases are used for grazing and access to the underground mining operations, including personnel and material supply and coal haulage from the underground mine to the preparation facilities. Coal preparation and management facilities are located on fee land.

River Gas Corporation intends to develop their oil and gas leases in the area adjacent to the mine facilities and contemplates using the pre-existing roads in the area. River Gas has oil and gas leases for all of Section 16, the N1/2 and the N1/2 S1/2 of Section 15, and Section 2 of T15S, R8E.. Also Carbon County's communication and relay facilities exist atop Star Point Ridge, adjacent to the mine facilities.

USFS lands on Gentry Mountain Meadow and Castle Valley Ridge are grazed by cattle. Gentry Mountain Meadow is grazed by 1,440 head of cattle, and the Castle Valley Ridge is grazed by 236 head of cattle between July 26 and September 30. Private land owned by U. S. Fuel Company is grazed by 200 to 300 head of cattle between May and November. The land managed by the BLM within the permit boundary is grazed. There are four livestock allotments, three for cattle and one for sheep. Total grazing allowed is 650 animal units per month.

Recreational use of the area affected by mining operations consists primarily of hunting and camping, however, growing use of the area by mountain bikers, ATV riders and hikers has been seen over the past few years. Heavy hunting of elk and mule deer occurs on Gentry Mountain. Gentry Mountain is frequently used for camping. There is no merchantable timber although much of the area is covered by Douglas fir, aspen, pinyon pine, and juniper. Timbering in the area will be dictated by the surface land owner(s) and no plans/contracts are known to exist for harvesting the timber in the area. During

the life of the mine the land use should remain the same: recreation; grazing; wildlife; and mining. During the last five years, land use within the permit boundary has not changed substantially.

The Manti-La Sal National Forest has established the Castle Valley Ridge Trail System which includes a trail in the area of CPMC mining as shown on Map 521.121g1, Subsidence Monitoring Plan. This trail crosses the surface above the 3rd North main entries and falls within the subsidence angle of draw as shown on the map. This trail could be impacted by subsidence. Discussions with Forest Service personnel have identified two alternatives for this trail: 1) the trail could be temporarily closed during the subsidence period to prevent any danger to trail users, and 2) the trail could be rerouted. Rerouting the trail would be difficult and costly. Since most of the ground movement during subsidence takes place over a few month period, closure of the trail would be for only a few months. If mining takes place during the winter when there is no use of the trail, there will be no inconvenience to anyone. Mining will be scheduled if possible to take advantage of the winter season, however, mining schedules are dependant on many factors and are very costly to change even by a few weeks. CPMC will work closely with the U.S. Forest Service to schedule closure of the trail if that alternative is chosen. Timing of mining beneath the trail will be known as mining approaches the area several months ahead of time, allowing adequate time to post closure of the trail. Once subsidence has stabilized, the trail can be reopened.

Any damage to the Castle Valley trail will be promptly repaired in accordance with commitments made in the subsidence section (500) of this permit document.

In order to assure that postmining land use will be the same as premining land use County Road No. 290 which provides access to Gentry Mountain and Carbon County's communications and relay facilities will remain in place after final reclamation (see Exhibit 412.200). The power line access road will remain as a service road for UP&L service access, as granted by Right -of-Way 1262. Other roads within the disturbed area will be reclaimed and costs for road reclamation are included within the bond.

The local, state, and federal managing authorities for areas within the permit boundaries are Carbon County, State of Utah, USFS and U. S. Bureau of Land Management (BLM).

The Carbon County zoning Code, amended December 28, 1981, zones the CPMC property as CE-2 Critical Environmental Zone. Section 4-2-17 of the Carbon County zoning ordinance states:

"The CE-2 Critical Environmental Zone covers certain mountain, riparian and other lands of environmental concern in the County which, because of the presence of less severe physical conditions, are of less critical environmental concern than the CE-1 Zone, and are suitable for limited levels of development activity."

"Historically, lands within this zone have been used for livestock grazing, wildlife habitat and the location of an occasional ranch, mine or recreational site."

The portion of the permit area within the Manti-La Sal National Forest is subject to the "Land Management Plan" of the USFS (1986). The surface facilities and Corner Canyon fan are included

within the Leasable Minerals Management Unit; the remainder of the permit area is within National Forest lands is within the Range Management Unit. The management objectives related to the permit area, as set forth by the USFS in the land management plan, are to improve and maintain watershed conditions, improve desirable plant species and vegetative cover, decrease soil erosion, maintain soil stability and productivity, coordinate mineral activities with other resource uses, manage and protect archaeological and paleontological resources, harvest timber and forest products on a sustained yield basis, provide quality recreational opportunities, coordinate transportation systems, and protect and maintain wildlife and fish habitats (USFS, 1979).

BLM planning under the "Management Framework Plans" for the Wattis unit states that all coal leases or permits must provide for minimizing or avoiding environmental damage and for rehabilitating lands affected by the operations. The lands in the project area and adjacent areas are used for mining, cattle grazing, recreation, and forestry. Recreational uses consist primarily of hunting, camping, and picnicking. Past and present land uses of the project area and the region as a whole are discussed in the following sections. The source of much of this information is the Draft Environmental Statement: Development of Coal Resources in Central Utah (U. S. Geological Survey, 1978).

The Central Utah coal region encompasses lands in federal, state, county, and private ownership. Land use management plans for public and National Forest lands generally allow for mine and mine-related activities. Coal mining has been an integral part of the region's economy. Mining and related construction activity dominate employment in Carbon and Emery Counties. Active mining is going on in areas adjacent to the permit area.

411.140. thru 411.145. CULTURAL AND HISTORIC RESOURCES INFORMATION.

Cultural and historic resources on and adjacent to the CPMC operation were inventoried on 6 separate occasions. Areas inventoried are shown on Map 112.500b. The first inventory conducted in 1980 and 1981 by Archeological-Environmental Research Corporation (AERC) of Salt Lake City, Utah, comprised Chapter 5 of the original permit. This chapter along with the pertinent responses in the Supplement resulting from the initial submittal are presented in Exhibit 411.140a, Historical and Cultural Resources.

The second inventory of Historic and Cultural resources was performed in May, 1982, by K.K. Pelli Cultural Resource Management Specialists of Moab, Utah. This study was performed in conjunction with the Unit Train Loadout. This report is in Exhibit 411.140a.

The third inventory was performed in November, 1983, by Nickens and Associates of Montrose, Colorado in conjunction with the Unit Train Loadout. This report is presented in Exhibit 411.140a.

The fourth inventory was performed in November, 1982, by P/S Scientific Inc., of Salt Lake City on the Corner Canyon Fan Breakout Area. This report is presented in Exhibit 411.140a.

The fifth inventory was conducted by Abajo Archaeology in July, 1987. This inventory covered the Gentry Ridge area and is presented in Exhibit 411.140a.

The sixth inventory was performed by the Office of Public Archaeology of Brigham Young University.

Review of this material confirms that there are no sites eligible for nomination to the National Register of Historic Places within CPMC's area of disturbance.

The Utah State Historical Preservation Office (SHPO) files were inventoried in June of 1997. The documentation and photographs collected in 1980 and 1986 of the town of Wattis were limited. Four photographs taken June of 1980 were located in the file, three of the lower pad area, including the tipple structure and one of a concrete garage, alleged to be a portion of the town schoolhouse. The file also included pages from the November 1980 report prepared by AERC., Centennial Echos from Carbon County, Daughters of the Utah Pioneers, 1948 and Carr's publication of Utah ghost towns. The files for the town of Wattis were re-evaluated by SHPO in 1986 and determined to be "to insignificant" to evaluate by Ryan Roper a SHPO employee.

The town of Wattis was allowed to deteriorate between the end of World War II and the mid 1950's. Residents and businesses associated with the town moved into larger communities such as Price and Helper. Eventually the town area was replaced by mine facilities as the mining operation expanded. The AERC survey performed in 1980/1981 contains photographs and descriptions of the town of Wattis as it existed in 1980/1981. Refer to Exhibit 411.140a for various cultural and archeological surveys.

The south half of Section 9, T15S, R8E was surveyed by AERC in 1978 for the BLM. The Lions Deck facilities are located within the south half of Section 9 and the northeast quarter of 17. A portion of the AERC report is contained in Exhibit 411.140a., Appendix 5A (although the copies are poor), with the full report having been submitted to the Moab office of the BLM in 1978.

The mine and town of Hiawatha and Morhland are the most noteworthy historical areas immediately adjacent to the Star Point Mine. Historical and archeological data for these areas can be reviewed at the U.S. Fuel office in Helper, Utah or SHPO in Salt Lake City, Utah.

During reclamation of the Star Point Mine site the old shop building and other structures in the general area will be removed and disposed of as described in Chapter 5, Engineering. Alternatives for retaining the old shop building, tipple, and other potential historical structures were explored by engineering personnel, however the methods needed to construct and maintain a stable slope behind the structures were not compatible with the retention of the structures. The old concrete tipple will be partially removed and covered during reclamation. The structures described above are on private property and the landowner retains the right of preserving or demolishing the structures.

There are no public parks or historic places in or near the permit area. There are no public parks or cultural or historic resources listed or eligible for listing in the National Register of Historic Places located within the permit area. Cultural and historic resources of the permit area are presented on Map 112.500b.

There are no cemeteries or Indian burial grounds identified within the permit area.

There are no areas within the permit boundary which are units of the national system of trails or the wild and scenic rivers system, including study rivers designated under Section 5(A) of the Wild and Scenic Rivers Act.

411.200. PREVIOUS MINING ACTIVITY.

Coal mining started in 1916. The Lion Coal Company operated Wattis No. 1 and 2 Mines until the end of 1963. There were no coal mining activities from 1964 through 1967. Plateau Mining, Ltd. operated the Star Point No. 1 Mine in the Hiawatha Coal Seam, which was not mined by Lion Coal Company, and the Star Point No. 2 Mine in the Wattis Coal Seam, previously the Wattis 1 Mine, from 1967 through the fall of 1971. United Nuclear Corporation acquired the Star Point Mines in the fall of 1971. The present day modernization of the coal mine started when the Lion Deck Portal Area was expanded in October, 1977. United Nuclear Corporation extracted coal through July 21, 1980. Since then, the coal has been produced by CPMC.

411.210. TYPE OF MINING METHOD USED.

Conventional (drill and blast) mining and room-and-pillar mining with continuous mining machines have been used in the past. Pillars were recovered as mining conditions permitted. The room-and-pillar system was the logical choice for recovering the coal in the old workings and for driving development openings into the virgin areas.

411.220. COAL SEAMS OR OTHER MINERAL STRATA MINED.

CPMC is located in Wattis, Utah, with the mine portals at approximately 8500 feet above sea level. The coal-bearing strata are in the lower 400 feet of the Blackhawk Formation of the Mesa Verde Group. Coal has been extracted from three seams, which, from uppermost to lowermost, are the Wattis, Third, and Hiawatha Seams. When mining began in the early 1900's, entry was made into the Third Seam and coal was extracted from it first. Mining was expanded into the Wattis Seam. Slopes connected the Wattis Seam with the Third Seam and provided access to the virgin western reserve area.

411.230. thru 411.250. EXTENT OF COAL OR OTHER MINERALS REMOVED.

From 1916 through 1963 approximately 12,000,000 tons of coal were removed from the Star Point Mines by Lion Coal Company. Between 1967 and the fall of 1971 approximately 750,000 tons of coal were extracted by Plateau Mining, Ltd. United Nuclear Corporation as UNC Plateau Mining Company mined approximately 5,000,000 tons of coal between the fall of 1971 and July 21, 1980. CPMC has mined approximately 12,000,000 tons between 1980 and 1990.

412. RECLAMATION PLAN.

412.100. POSTMINING LAND USE PLAN.

The postmining land uses will be the same as premining uses. These uses include livestock grazing and wildlife habitat. Table 412.100a, summarizes the disturbed areas and their postmine land uses. Refer to Exhibit 412.200a for property exchange, easement, right-of-way, maintenance, and use agreements.

412.110. ACHIEVEMENT OF PROPOSED POSTMINING LAND USE.

Grazing and wildlife as a postmining land use will be achieved by implementing the Reclamation Plan. This Plan allows for reclaiming disturbed areas, replanting species compatible with grazing and wildlife habitat. The land could also be utilized for recreation as it was prior to mining activity. Public access to the area will be by County Road No. 290, which will remain after final reclamation as an essential part of the postmining land use.

Reclamation of the refuse pile is discussed in Section 540 and 550 of this M&RP. The implementation of the reclamation plan should be sufficient to return the refuse to the intended postmining land use.

412.120. thru 412.130. RANGE OR GRAZING LAND USE.

Table 412.100a: Ownership and landuse of the Star Point Mine site.

OWNERSHIP & LAND USE				
SEEDED AREA	OWNERSHIP	PREMINING LAND USE	PROPOSED POSTMINING LAND USE	ABILITY TO SUPPORT POST-MINING LANDUSE
SALTBUSH	BLM	wildlife habitat, grazing	wildlife habitat, grazing	adequate
SAGEBRUSH	BLM, private	wildlife habitat, grazing	wildlife habitat, grazing	adequate
MOUNTAIN GRASSLAND	USFS, State, private	wildlife habitat, grazing	wildlife habitat, grazing	adequate
FOREST SERVICE	USFS	wildlife habitat, grazing	wildlife habitat, grazing	adequate

Postmining land uses are to be achieved by effectively reclaiming disturbed areas including the establishment of a diverse vegetative cover compatible with wildlife and livestock grazing. No alternative postmining land uses are proposed.

412.140. thru 412.200. CONSISTENCY WITH SURFACE OWNER PLANS AND APPLICABLE UTAH AND LOCAL LAND-USE PLANS.

The reclamation plan is consistent with all state, federal and local land use plans and programs, including surface water plans.

The surface owners of record agree with the post mining land uses. No other comments have been received. Copies of letters sent to the land owners by CPMC are presented in Exhibit 412.200a, Land Owner Letters. Exhibit 412.200a also contains various documents pertaining to postmining land uses.

412.300. SUITABILITY AND COMPATIBILITY.

Following the removal of the surface facilities, the affected areas will be restored to a condition capable of supporting the premining land uses. This will be achieved by implementing the reclamation plan described in response to R645-301-542. Specifically, the affected area will be regraded to the approved contour, drainage patterns will be restored, soil material will be reapplied and the seed mixtures will be planted.

All reclaimed areas will be capable of supporting the postmining land uses. Based on the results of interim vegetation, vegetation test plots, ongoing vegetation monitoring and data gathered over two permit terms, the soils in the disturbed areas are capable of supporting a variety of vegetation compatible with current and postmining land uses.

413. PERFORMANCE STANDARDS

413.100. thru 413.120. POSTMINING LAND USE.

All disturbed areas will be restored in a timely manner to conditions that are capable of supporting premining land uses or higher or better uses.

413.200. thru 413.220. DETERMINING PREMINING USES OF LAND.

The postmining land uses will be the same as the premining land uses.

413.300. thru 414.300. CRITERIA FOR ALTERNATIVE POSTMINING LAND USES.

The postmining land uses will be the same as the premining land uses.

420. AIR QUALITY.

421. thru 422. CLEAN AIR ACT AND OTHER APPLICABLE LAWS.

CPMC has and will continue to make every effort to comply with requirements of the Clean Air Act, the Clean Water Act, and the laws pertinent to this section. The information presented in R645-301-700 describes how the hydrologic resource will be protected. NPDES permit UT-0023736 will continue to be in effect for the CPMC operations. The applicable air quality permit issued by the Utah State Department of Health will be maintained and CPMC will endeavor to comply with these permits. The Utah State Health Department does not require air quality monitoring programs except for major sources. CPMC has not implemented a monitoring program. Meteorological data, including wind speed and direction, were collected over a three year period to establish a baseline for prevailing winds in the event monitoring equipment placement becomes necessary.

Fugitive dust control measures have been implemented on all facilities at CPMC. All surface operations including construction and reclamation operations are conducted utilizing dust control measures. Approval orders have been received from the Utah State Department of Health for all facilities at CPMC. These approval orders are as follows: Coal Production Increase and Waste Area Expansion approved Aug. 5, 1981; Fly Ash Collector for Mine Repair Boiler approved Nov. 6, 1981; Rock Dust Distribution System approved March 18, 1982; Coal Fired Boiler Lion Deck Bath House approved March 15, 1985; Unit Train Loadout approved April 28, 1982; and Unit Train Loadout Modification approved August 19, 1985; Approval Order For Modification to Star Point Coal Mine and Processing Facility DAQE-886-96, September 20, 1996. A copy of Approval Order DAQE-886-96, replacing all Approval Orders issued for this location is presented in Exhibit 422a, Air Quality Approval Correspondence.

Unpaved roads are periodically watered when conditions dictate. Speeds on these roads are restricted to twenty five miles per hour to reduce fugitive dust. Chemical stabilization has not been necessary. In the event it does become necessary, nontoxic agents will be used.

The main access road, which carries the vast majority of traffic, is paved to prevent fugitive dust. Traffic is restricted to established roadways.

Accumulations of coal, rock and other dust forming materials are promptly removed from roads. Unpaved roads are periodically graded and compacted to stabilize the surfaces.

Dumping of coal has been restricted and eliminated where possible by constructing stacking tubes. Heights of free-falling coal have been reduced to the lowest level possible. Coal in the system has surface moisture from the mining and washing processes which helps reduce fugitive dust. Coal stockpiles are inspected daily, and burning areas are removed and cooled to prevent further burning.

All transfer points on conveyors are enclosed to prevent fugitive dust losses. Conveyors have covers to prevent dust loss. Fugitive dust from loading of coal at the silo and the truck loading point is controlled with chutes, hoods and by reducing the drop distance as well as with water sprays.

The coal refuse material contains approximately 20% moisture which eliminates any fugitive dust from this material. After it is spread and dried, it crusts over which reduces dust loss from the pile.

Disturbances to land are kept to a minimum to prevent unnecessary dust. Those areas which are disturbed during construction that are not necessary for surface facilities are promptly seeded to stabilize the surface material.

Very little surface drilling and blasting are conducted at CPMC. When they occur, appropriate measures are used to control dust emissions.

423. SURFACE COAL MINING AND RECLAMATION ACTIVITIES EXCEEDING 1,000,000 TONS PER YEAR.

No surface mining takes place at CPMC.